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Identification of Posttraumatic Stress Disorder Symptoms in Post-ICU Patients

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Identification of Posttraumatic Stress Disorder Symptoms in Post-ICU Patients

by

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Abstract

Background: Patients receiving critical care are experiencing post-traumatic stress syndrome (PTSS) as a result of life-saving interventions received in the intensive care unit (ICU). PTSS is associated with poor patient outcomes and decreased quality of life compared to post-ICU patients without PTSS. Personal and clinical characteristics that place patients at higher risk for PTSS are still being examined. It is also unknown to what extent patients are being screened for ICU-induced PTSS.

Objectives: This body of work aims to examine the risk factors associated with ICU-related PTSS and describe the screening experiences of patients who recently received care in an ICU. The work will be presented in three manuscripts.

Methods: A single-center, descriptive, correlational design was used. Personal and clinical characteristics were obtained from medical records on a sample of 41 patients recently transferred out of the ICU. Two to four weeks after hospital discharge, patients completed the PTSS-14 and a Screening Experience Questionnaire via telephone. Screening experiences and the feasibility of the PTSS-14 in this population was described and associations between the personal and clinical characteristics and PTSS-14 scores were examined.

Results: The first manuscript titled "ICU-related PTSD; The Importance of Nurse Involvement" is under review at *Critical Care Nurse*. The purpose of this manuscript is to examine current literature addressing risk factors, negative health outcomes, and nursing roles in identifying patients at risk for PTSS. The second manuscript titled "A Concept Analysis of ICU-related PTSD" is under review at *Journal of Advanced*

Nursing. The purpose of this manuscript is to report a concept analysis of ICU-related PTSD. Manuscript three is titled "Identification of Posttraumatic Stress Disorder Symptoms in Post-ICU Patients" and is being submitted to *American Journal of Critical Care*. The purpose of this manuscript is to report the study's results. It was found that the majority of patients were not screened, and none received education about the risk of PTSS after ICU care. The PTSS-14 was found to be an acceptable and feasible way to identify at risk patients and higher PTSS-14 scores were correlated with depression, moderate levels of sedation, number of days sedated, and delirium. Further research is needed to address strategies in implementing early screening for PTSS, and to determine if early identification and referral of at-risk patients can reduce the incidence of PTSD in this population.

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Dedication and Acknowledgements

My dissertation is lovingly dedicated to my husband Brian, who despite having a stressed wife and taking on more responsibilities at home managed to stay in good humor, cook amazing meals, know when I needed to get out town (and book the flight), and provide inspiring pep talks or wine at the end of a long day (or both). To my daughter Olivia, who is still too young to understand what I've been so busy doing or the joy she has brought me during this stressful time. To my parents James and Lora for their unconditional love and support, instilling in me a strong work ethic, giving me space to explore the world, and letting me make mistakes along the way. To my sister Emily for her unwavering support mixed with tough love and humor.

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Heather

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Chapter 1

Introduction

Problem Statement

Treatment of the critically ill has improved to the point where an increasing number of patients are surviving to be discharged home or to a care facility and expected to make a meaningful recovery. This has led to an increased awareness of the consequences life-saving interventions can have on the patient emotionally and physically. Posttraumatic stress disorder (PTSD) is a debilitating stress disorder caused by experiencing or witnessing a traumatic event and is associated with many negative physical and psychological health outcomes in the general population. It is estimated 17% of patients in the year following their ICU discharge meet diagnostic criteria for PTSD versus approximately 7% in a control group (O'Donnell et al., 2010). The fragile medical condition of these patients taxes their ability to cope with external stresses making them particularly vulnerable to developing PTSD as a result of their ICU experience. Furthermore, the environment and invasive treatments in the ICU are often outside of the realm of normal for most patients, further straining their ability to cope

during and after the experience. Intubation and mechanical ventilation, sedation and vasopressors which activate the sympathetic nervous system, and restraint use can be essential in saving an individual's life despite their potential long term consequences to the psychological and physical health of these patients. This combination of disease, sedative medication, and environmental stressors can prevent the individual from forming real memories of the event, leaving the patient with no memory of their hospitalization, or delusional memories and nightmares such as of the nurse drowning the patient when in reality she was performing endotracheal suctioning (Jones, Griffiths, Humphris, & Skirrow, 2001).

The characteristics or inherent risk factors for developing PTSD in the ICU population are consistent with those in the non-ICU population. Younger individuals (Rocha, Peterson, Meyers, & Boutin-Foster, 2008; Wallen, Chaboyer, Thalib, & Creedy, 2008) and females (Girard et al., 2007; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995) are at a higher risk than those over 65 years of age and of male gender. Patients with high trait anxiety, pre-ICU anxiety, and depressive disorders were found to have a higher rate of PTSD following discharge from the ICU than those without such a psychological history (Davydow, Gifford, Desai, Needham, & Bienvenu, 2008). Additionally, individuals reporting higher levels of perceived social support had lower levels of PTSD and PTSS (Ozer, Best, Lipsey, & Weiss, 2003). Social support has also been shown to improve treatment outcomes in patients with PTSD (Thrasher, Power, Morant, Marks, & Dalgleish, 2010).

Pinpointing environmental factors, such as the treatments and interventions performed in the ICU, that contribute to a patient developing PTSD has been more difficult. Inconsistencies between studies around duration of ICU stay, days on mechanical ventilator, and severity of illness give little insight into these factors (Davydow et al., 2008). Research is, on the other hand, starting to show a link between the dosage of exogenously administered catecholamines and the intensity of PTSD symptoms (Schelling, Briegel, Stoll, Rothenhaeusler, & Kapfhammer, 2000) and the use of sedatives like benzodiazapines or neuromuscular blocking agents have been more consistently associated with a higher risk of PTSD (Davydow et al., 2008; Girard et al., 2007; Nelson, Weinert, Bury, Marinelli, & Gross, 2000). Furthermore, the absence of a daily awakening trial for sedated patients is associated with higher rates of PTSD (Kress et al., 2003). Related to sedation, it has been found that episodes of agitation and restraint use are associated with PTSD (Davydow et al., 2008).

What appears to put an ICU patient at risk for PTSD may not be the life-saving interventions and treatments received in the ICU, but rather the treatments that must occur to make interventions such as mechanical ventilation tolerable for the patient. Benzodiazipines, like midazolam, have an amnesic effect on patients and amnesia is correlated with increased incidence of PTSD (Granja et al., 2008).

A growing body of research shows patients in the ICU have fewer factual memories of their experience in the ICU after discharge and more delusional memories. Jones et al. (2001) believes these delusional memories perpetuate the anxiety symptoms and the real memories are protective against PTSD. Furthermore, the environment of the unit itself prevents restful sleep combined with the stress of the critical illness on the

patient's body which perpetuates ICU delirium placing the patient at risk for PTSD (Figueroa-Ramos, Arroyo-Novoa, Lee, Padilla, & Puntillo, 2009; Freedman, Gazendam, Levan, Pack, & Schwab, 2001).

PTSD in this population can have long term consequences for the patient's physical and mental recovery, as well on his quality of life. Factors that put a patient at risk are under study; however, it has yet to be understood how medical professionals can mitigate these risk factors for patients while they are in the ICU. Sedation, for example, is a necessity not only to make the patient more comfortable during mechanical ventilation, but also to prevent further exacerbation of a critical illness by decreasing oxygen consumption and metabolism. ICUs are beginning to incorporate protocols to reduce the amount of sedation used and promote daily awakenings, but high levels of sedation are still in use.

Currently, in the military and civilian populations, PTSD requires professional treatment such as therapy and psychotropic medications to facilitate coping. Early identification of PTSD is key in preventing comorbidities such as drug abuse and depression. It is also integral in restoring social function, returning to work, and obtaining appropriate medical treatments for physical conditions. One of the goals of this study was to identify patients at risk for PTSD, and thus not meeting full criteria for PTSD. This study assessed for posttraumatic stress disorder symptoms (PTSS), a term used to describe the presentation of many, or all, of the symptoms of PTSD prior to 30 days. Therefore, the purpose of this study was to identify ICU patients at risk for PTSS and determine if they're being screened and referred to treatment. Further this study explored person and environmental factors that may increase risk for development of PTSS in this

vulnerable population. As an exploratory aim, the feasibility of using the PTSS-14 to identify ICU patients at risk for PTSS was described.

This disorder affects a significant number of ICU patients and there are inherent non-modifiable risk factors, in the individual, like gender and age, that put the person at further risk. The role the ICU environment plays, including treatments like sedation and intubation, is not well understood. It is imperative patients who have been discharged from the ICU are being screened for PTSD and PTSS and the appropriate referrals are made so they can receive proper treatment once discharged from the hospital. It was hypothesized that the patient's psychological health is not being addressed after discharge from the ICU due to a lack of familiarity with the disorder in this population, as well as a lack of appreciation for the fact PTSD will further complicate the patient's physical and mental recovery.

Background and Significance

PTSD is a severe anxiety disorder that results when an individual experiences or witnesses a trauma to another individual. The disorder is characterized by the person re-experiencing the event via flashbacks or nightmares, as well as autonomic nervous system arousal which manifests as difficulty sleeping, irritability, and a low startle threshold. Individuals also report a numbing feeling and tend to avoid places, people, and situations associated with the trauma (American Psychiatric Association, 2013). The ICU patient population is particularly at risk due to their fragile physical state, alterations in mental status, and increase in stress response as a result of the critical illness.

Prevalence of PTSD in the ICU population.

Current research estimates the lifetime prevalence rate of PTSD amongst adult Americans to be 6.4% (Pietrzak, Goldstein, Southwick, & Grant, 2011). Studies have attempted to estimate the prevalence of PTSD in patients discharged from the ICU, but many were small samples and fraught with methodological errors such as assessing for PTSD before thirty days, using self-report scales not validated in the population, and high participant attrition (Davydow et al., 2008; Griffiths, Fortune, Barber, Duncan, & Young, 2007). Recently, a large randomized cohort study found the prevalence of PTSD in a population of trauma ICU patients, one year after discharge, to be 17% (O'Donnell et al., 2010). Among their control group, trauma patients not admitted to the ICU, they found a 7% prevalence of PTSD which coincides with the 6.8% rate of the total American population mentioned earlier. These numbers illustrate the ICU population is at higher risk for developing PTSD than the general population. The significance of this issue grows as demand for ICU services escalates due to the expanding elderly population and the increasing level of severity in illnesses treated within the hospital.

Negative health outcomes.

The negative health outcomes related to PTSD are numerous and can lead to many chronic health conditions, complications, and longer length of stays within the hospital. There is evidence linking PTSD with cardiovascular disease (Boscarino & Chang, 1999; Kubzansky, Koenen, Jones, & Eaton, 2009), as well as metabolic syndrome (Violanti, et al., 2006), a known cluster of cardiovascular symptoms that put a person at risk for coronary artery disease (CAD), stroke, and type II diabetes. This occurs through sympathetic nervous system activation leading to the release of hormones that increase

the heart rate and blood pressure leading to atherosclerosis and a dampened immune response (Vedhara & Irwin, 2005). Furthermore, individuals with PTSD have an increased risk of developing various autoimmune diseases, such as rheumatoid arthritis, hypothyroidism, and psoriasis (Boscarino, 2004). If a critically ill patient develops PTSD while in the ICU, the prolonged stress response that occurs within the body can lead to poorer health outcomes and a longer recovery time for admitting physical illness (Abu-Ruz, Lennie, & Moser, 2011).

Negative psychological outcomes.

Some of the classic symptoms of the disorder, such as re-experiencing the trauma via dreams, profound tiredness, and weakness, have been found to make home recovery difficult for the patient after hospital discharge (Hall-Smith, Ball, & Coakley, 1997). PTSD is also associated with increased rates of depression, substance-related disorders, anxiety disorders, and bipolar disorder (American Psychiatric Association, 2000). Depression is particularly concerning as the lifetime prevalence of depression in individuals who also have PTSD is approximately 35% versus 14% in those without PTSD (Pietrzak et al., 2011). Disorders that occur concomitently with PTSD further complicate not only the person's ability to function in society but to obtain the required follow up medical treatment for the acute physical illness. PTSD is also related to higher rates of suicidal behaviors (Sareen et al., 2005) further illustrating the inability of the individual to synthesize and incorporate their traumatic experiences.

Impact of PTSD on quality of life.

The concept of quality of life (QOL) is hard to pin down and differs across disciplines due to its multidimensionality and the fact it is largely subjective; having a

different meaning among individuals and disciplines. There are many valid and reliable self-report tools to measure QOL in health care, as well as the concept of health-related quality of life (HRQOL) a concept that is more focused on an individual's physical and psychological health, as well as associated factors such as health risks, functional status, and social support (Centers for Disease Control and Prevention, 2011). ICU survivors have been found to have a lower QOL than the general population in the majority of domains assessed by QOL questionnaires, especially in the areas of mental health and health perceptions (Dowdy et al., 2005). The disorder has also been linked to poorer health-related functioning in veterans with PTSD compared to veterans without PTSD, illustrating these patients continue to suffer psychologically, as well as physically (Barrett et al., 2002). PTSD is also associated with patients not being able to return to work after hospitalization which highlights just how debilitating this disorder can be (Cheung et al., 2006).

Due to the stigma of PTSD and psychological disorders as a whole, it has been found that most patients with mental disorders, including PTSD, tend not to seek help for their mental disorders (Kessler et al., 1994; Kessler et al., 1995). Screening patients for this disorder at hospital discharge or during outpatient follow-up with their primary care provider might be the most effective way to diagnose PTSD, or other mental health disorders, like depression, which commonly occurs with PTSD in this population. Moreover, it is imperative that patients recently discharged from the ICU are identified early due to the risk of acute PTSD developing into a chronic issue and leading to various chronic illnesses, depression, substance abuse, and difficulties regaining social function, as well as decreased productivity.

Theoretical Framework

This study was guided by the Transactional Theory of Stress and Coping (TTSC) developed by Lazarus and Folkman (1984). The theory emphasizes the relationship between person and environment in the development of stress with the two major themes of appraisal and coping. Stress is theorized to occur when the environmental demands exceeds one's resources (see Figure 1).

Appraisal.

Appraising of a situation can be a conscious or unconscious effort by the individual that is influenced by person antecedents such as previous experience, personality, personal goals, and resources, as well as environmental antecedents including harms, benefits, threats, and challenges. The event is appraised as benign, harm or loss, a challenge, or a threat. The appraisal is intertwined with the individual assigning a level of personal significance to the information called relational meaning in the theory. This is where the emotion emerges that will be tied to the event.

Coping.

The concept of coping is defined as the person's effort to manage psychological stress. How effective the coping mechanism is the person employs depends on the type of threat and how stressful the person perceives the event. Part of the coping process involves a re-appraisal of the event and if coping is determined to be effective, a revised relational meaning of the stressful event will develop. This results in the formation of new emotions about the stressful event creating balance once again between the environmental demands and personal resources. This model is displayed in a linear

fashion, however, Lazarus and Folkman note many of these processes occur simultaneously and may be cyclical in the coping process (Lazarus & Folkman, 1984).

Critical person and environment factors.

In patients recently discharged from the ICU, specific person factors such as age, gender, and prior history of PTSD may greatly influence stress appraisal and coping capacity. Likewise, specific environmental factors unique to the ICU, such as the use of exogenous catacholamines, sedation, mechanical ventilation, and sleep deprivation, can greatly influence risk for PTSD.

Statement of Purpose

Critically ill patients receiving care in the ICU are at greater risk for subsequent PTSS. The purpose of this study was to identify ICU patients at risk for PTSS and determine if they're being screened and referred to treatment. Further this study explored person and environmental factors that may increase risk for development of PTSS in this vulnerable population. As an exploratory aim, the feasibility of using the PTSS-14 to identify ICU patients at risk for PTSS was described.

Aims

The specific aims of this study were to:

1. Identify screening and educational experiences related to PTSS.
2. Examine the person and environment factors related to increased risk for PTSS.
3. An exploratory aim is to determine the feasibility and acceptability of a screening instrument to identify PTSS.

Chapter 2

Literature Review

Definition of Posttraumatic Stress Disorder

Posttraumatic stress disorder (PTSD) is a recent addition to the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM) having been added to the third edition in 1980 (American Psychiatric Association, 1980). Since the advent of the disorder's acceptance into the DSM, the criteria for what constitutes a traumatic event continues to evolve as the disorder is diagnosed due to a wider range of non-war related traumatic events.

PTSD entails a profile of symptoms that occurs after an individual has experienced or witnessed a traumatic event. The hallmark symptom includes a re-experiencing of the event that often manifests as nightmares or realistic flashbacks while the person is awake. People who suffer from PTSD also avoid situations, places, and individuals that remind them of the trauma and have a numb feeling that leaves them feeling detached from loved ones and dampens their range of emotions. Increased autonomic nervous system (ANS) activation causes symptoms such as irritability,

hypervigilance, low startle threshold, and sleep disturbance. To meet diagnostic criteria these symptoms must occur together for at least one month after the event and cause significant distress or dysfunction in the person's life (American Psychiatric Association, 2013).

Acute Stress Disorder

PTSD should not be confused with acute stress disorder (ASD) which is intended to capture acute stress reactions that begin three days after a trauma and last up to one month. Ideally, this diagnosis should help to identify individuals who might be at risk for developing PTSD. The other major difference between ASD and PTSD is the timeframe in which the diagnosis is made (American Psychiatric Association, 2013). In a literature review by Bryant (2011) it was determined that a diagnosis of ASD did not predict the majority of people who would later go on to develop PTSD. He suggests requiring individuals to meet diagnostic criteria for ASD as a predictor of PTSD will not be sufficient to identify these individuals early. However, more research will be needed on this topic as the diagnostic criteria for ASD was revised in the new DSM-V and Bryant's literature review takes into account research done using old ASD diagnostic criteria.

Posttraumatic Stress Symptoms (PTSS)

The term PTSS is a commonly used term in PTSD literature to describe the presentation of many of the symptoms of PTSD but does not meet full diagnostic criteria for PTSD. This study will be assessing patients for symptoms of PTSD prior to 30 days after discharge with the intent of identifying individuals at risk for developing PTSD. Therefore, these patients could not be given a diagnosis of PTSD even if they met all DSM-V criteria. Due to the inadequacy of a diagnosis of ASD in predicting PTSD, this

diagnosis will also not be used. Because a diagnostic interview will not be performed in this study, the term PTSD will not be used as a formal diagnosis. Instead, a screening tool called the Post traumatic stress syndrome scale (PTSS-14) will be utilized to identify PTSS in this patient population two to four weeks after hospital discharge. Therefore, the term PTSS will be used to describe individuals who exhibit many, or all, of the symptoms of PTSD prior to 30 days.

The Human Stress Response

The human body is well adapted to maintaining homeostasis during acute stressors due to the autonomic nervous system's sympathetic nervous system (SNS), which is responsible for the hypothalamic-pituitary-adrenal (HPA) axis and the sympathoadrenomedullary (SAM) system initiated stress response. The HPA axis is responsible for initiating the release of cortisol from the adrenal cortex, which functions to augment the body's energy supply, via reducing the activity of most bodily systems, including the immune system, and also increases glucose levels. Meanwhile, the SAM system prompts the adrenal medulla to pump epinephrine and norepinephrine into the bloodstream where they find target organs such as the heart and increase heart rate and contractility. Additionally, blood vessels constrict, bronchioles expand, and blood is diverted away from non-essential areas such as the gastrointestinal tract and peripheral circulation allowing higher volumes of oxygen to reach vital organs. Once the stressful event has passed, a negative feedback loop initiated by cortisol shuts down the SNS/fight or flight response and returns the individual to the parasympathetic nervous system (PSNS)/rest and digest phase in with the heart returns to its resting rate, digestion

resumes, respirations return to baseline, and all other systems that were put on hold resume normal function.

This effective response can become disrupted during periods of chronic stress putting the body at risk for excessive systemic inflammation leading to immune and metabolic disregulation, endothelial damage, cytokine imbalance, carbohydrate intolerance, dyslipidemia, and insulin resistance (Elenkov, Iezzoni, Daly, Harris, & Chrousos, 2005). There is also evidence linking abnormalities of cortisol and cytokines in the hippocampus with memory impairment due to their effects on neural plasticity, but the mechanism under which this occurs is still under study (Gill, Saligan, Woods, & Page 2009; Goshen & Yirmiya, 2010). Despite the uncertainty around how this memory impairment occurs physiologically, it is a common finding associated with individuals diagnosed with PTSD and believed to be a major factor in the development of PTSD and maintenance of its symptoms (Jones et al., 2001).

An increased awareness has been brought to a unique population suffering from PTSD; patients who survive life threatening illness in the intensive care unit (ICU). More of these patients are surviving their critical illnesses and are left with lasting emotional deficits that affect their physical and emotional recovery, as well as their quality of life. Notably, many medical professionals are unaware of the psychological and physical consequences that can occur as a result of surviving a critical illness and the effects they can have on recovery and productivity.

Prevalence of PTSD

In the American population, PTSD is estimated to affect 6.4% (Pietrzak et al., 2011) to 8.7% of adults (American Psychiatric Association, 2013). The prevalence of PTSD in the ICU has been difficult to determine with estimates spanning 0% to 64%. This wide variation has been attributed to small sample sizes, high dropout rates, and the use of a wide variety of assessment measures (Griffiths et al., 2007). Further methodological issues involve the definition of PTSD where terms like PTSD, ASD, and "PTSD related symptoms" are used without the author properly defining the term. Most troublesome is when prevalence was determined by a diagnosis of PTSD made solely from data collected using a screening tool like the Impact of Events Scale (IES) or the Posttraumatic Symptom Scale (PTSS-10). These tools are not meant to be diagnostic; they are meant to identify at risk individuals in order to do further testing to determine their diagnosis and ensure proper treatment. Rarely were structured clinical interviews like the Structured Clinical Interview for the DSM-IV (SCID), the gold standard for diagnosis, administered in prevalence studies (Griffiths et al., 2007; Jackson et al., 2007).

A cohort study aimed at addressing these methodological errors was conducted (O'Donnell et al., 2010) using a sample of 829 randomly selected participants at multiple centers over a two year period. Participants were assessed for PTSD 12 months after their injury using the Clinician Administered PTSD Scale (CAPS-IV), a valid and reliable structured clinical interview. Seventeen percent of patients in the year following their ICU discharge meet diagnostic criteria for PTSD. Interestingly, a 7% prevalence of PTSD was found among their control group which coincides with the prevalence rates of the general American population mentioned earlier. This methodologically rigorous study

provides a sound estimate of the current prevalence of PTSD in the post-ICU patient population.

A systematic review of the literature conducted by Davydow et al. (2008) examined 15 studies in which a clinician made the diagnosis of PTSD arrived at a similar prevalence in this population of 19%. With numbers double the general population, determining if these patients are being screened and treated warrants further exploration.

Person Factors Associated With Increased Risk For PTSS

There are several, non-modifiable, person factors correlated with a higher risk of PTSD. Younger age has been consistently correlated with an increased risk of PTSD (Girard et al., 2007; Talisayon, Buckley, & McKinley, 2011; Wallen et al., 2008). Females versus males, both in the general population and the post-ICU population, are at greater risk for developing PTSD (Davydow et al., 2008; Girard et al., 2007; Samuelson, Lundberg, & Fridlund, 2007). What puts women at greater risk for PTSD is not well understood. The difference is not accounted for in the higher rates of depression and anxiety or higher prevalence of sexual assault experienced by women (Tolin & Foa, 2006). Prior psychiatric history, alcohol abuse, and depressive disorders are also commonly associated with PTSD in this population (Nickel et al., 2004). The trait of pessimism has also been found to be strongly correlated with the disorder in ICU patients (Myhren, Ekeberg, Toien, Karlsson, & Stokland, 2010).

Social support

A literature review including 11 studies evaluating the association between perceived social support after trauma and PTSS found individuals reporting higher levels

of perceived social support had lower levels of PTSD and PTSS. This association became stronger with time (Ozer et al., 2003). The authors suggest that social support could be a type of secondary prevention or that the effects of social support are cumulative and therefore stronger the further out an investigator assesses the patient for PTSD. In a randomized controlled trial of 77 participants who completed therapy for PTSD, Thrasher and colleagues (2010) found individuals who had more social support had better treatment outcomes than patients will poor social support.

ICU Treatment Factors Associated With Increased Risk of PTSS

Severity of illness and length of stay.

Severity of illness and length of hospital stay have been suspected to be major players in the development of PTSS in the ICU population. Due to this, it has been a frequent topic of research. Length of stay has consistently been found not to be associated with development of PTSD in the critically ill population (Davydow et al., 2008; Wallen et al., 2008). Similarly, severity of illness has not been found to be associated with PTSD in ICU patients (Girard et al., 2007; Nelson et al., 2000; Nickel et al.,2004).

Mechanical ventilation.

Mechanical ventilation is the movement of gas in and out of the lungs controlled by an external device that is inserted into the patient's airway via an endotracheal tube. The objectives are quite diverse and include reducing respiratory effort, decreasing oxygen demand, facilitating sedation, and maintaining oxygenation. The ventilator has the potential to use positive or negative pressure to push air into the lungs at a set rate, pressure, or volume. The actual duration a patient requires mechanical ventilation is

equally diverse; ranging from a few hours for a procedure to years in patients unable to produce their own respiratory effort or maintain oxygenation.

Duration of mechanical ventilation has been shown to be a risk factor for PTSS in patients who survive acute lung injury/acute respiratory distress syndrome (ALI/ARDS) (Davydow et al., 2008; Nelson et al., 2000). A recent multicenter study of 213 ICU patients with ARDS found 39% of patients met criteria for PTSD after begin discharged from the hospital (Mikkelsen et al., 2012). However, the link is still unclear among ICU patients hospitalized for other reasons. No relationship between duration of mechanical ventilation and symptoms of PTSD in a large prospective cohort study conducted in medical and cardiac ICUs was found (Girard et al., 2007). In contrast, a smaller prospective cohort study found a direct correlation between duration of mechanical ventilation and PTSD symptoms was reported (Cuthbertson, Hull, Strachan, & Scott, 2004).

Exogenous catecholamines.

Catecholamines such as epinephrine and norepinepherine are often administered to patients in the ICU who have profound hypotension due to cardiac or vascular failure or systemic infections. Administration of these medications is generally only done in the ICU or other unit that is equipped to care for the critically ill patient. It has been found the total administered dose of norepinephrine is associated with the intensity of PTSD symptoms (Schelling et al., 2000). Furthermore, epinepherine dosage has been positively associated with the number of traumatic memories patients have of their ICU experience (Schelling, Rothenhausler, Krauseneck, Nollert, & Kapfhammer, 2003). Patients who require these medications tend to be sicker than other patients which potentially adds

confounding variables such as other treatments or medications associated with PTSS to these findings. Yet, the link between administering exogenous stress hormones, PTSS, and traumatic memories in these patients is compelling as it may provide an important neurobiological understanding of PTSD in this population.

Restraints and agitation.

Restraints can be any physical or chemical intervention aimed at immobilizing patients with the purpose of preventing them from hurting themselves or others. In the ICU, patients are often restrained to prevent them from removing life sustaining devices such as endotracheal tubes, as well as if they're very agitated or aggressive and pose a risk to themselves or hospital staff. Agitation is often managed first with sedative medications, thereby called chemical restraints. However, it is contraindicated to sedate some patients. Therefore, these patients are often restrained with physical restraints such as soft wrist restraints or mittens. Factors such as restraint use and agitation require more research. However, the few studies conducted show strong associations between these variables and predicting PTSD in patients discharged from the ICU (Jones et al., 2007; Samuelson et al., 2007).

Sedation.

Sedation is the use of medications such as benzodiazepines or other anesthetic agents to reduce a patient's consciousness for a period of time. It is clinically used to make procedures or operations more comfortable for the patient, reduce agitation, and decrease oxygen demand. Extensive research looking at the relationship between sedation and the development of PTSS in this patient population has been published. In a literature review conducted by Davydow et al. (2008), higher levels of benzodiazepine use in the

ICU is a "consistent predictor" of PTSD symptoms. Total dose of lorazapam in this population was found to be positively correlated with PTSD symptoms using the Posttraumatic Syndrome Scale-10 (PTSS-10). Additionally, the number of days a patient spent sedated or having a neuromuscular blockade was associated with higher levels of PTSD, but no relationship was found between the high and low sedation groups (Nelson et al., 2000). Some debate exists related to the link between level of sedation and PTSD symptomology, as Weinert and Sprenkle (2008) found no relationship between participants who were the least and most sedated and higher rates of PTSD. Despite the amount of research looking at the role benzodiazepines play, it is still unknown if they are a causative or associated factor in the development of PTSS.

The spontaneous awakening protocol used in ICUs to reduce the level of sedation and allow for assessment of neurologic status has been shown to improve patient outcomes by reducing the days on a mechanical ventilator and length of stay within the hospital (Kress, Pohlman, & Hall, 2000). In order to perform a spontaneous awakening trial, the patient must not have active seizures, be in alcohol withdrawal, receiving paralytics, have current signs of agitation, myocardial ischemia, and must have an intracranial pressure within normal limits. If these criteria are met, the nurse will turn off all sedation and assess the patient's neurological status. If the patient experiences anxiety, agitation, pain, respiratory distress, or acute cardiac arrhythmias, the patient is considered to have failed the trial and sedation will be turned on at half the previous rate and titrated accordingly (Vanderbilt University Medical Center, 2008). In a randomized study, a protocol like this was shown to improve psychological outcomes, as well as display a trend toward lower incidence of PTSS (Kress et al., 2003).

Delusional memories.

Delusional memories are false memories of an event that tend to be persistent over time. ICU patients are reporting unsettling delusional memories of their hospitalization interwoven with real events from that time (Jones, Griffiths, & Humphris, 2000) and often experienced as intrusive memories such as flashbacks or nightmares. Delusional memories are strongly associated with development of acute PTSS in this population and are more likely to be retained over time than factual memories from the ICU. Unfortunately, factual memories of real events are less emotionally salient to the individual and therefore decrease over time, leaving the emotionally charged delusional memories as the primary memories of the ICU (Jones et al., 2007). A common belief among ICU nurses is no memory of the ICU is preferable. A large multicenter study found nearly half of their participants had no memory of their admission to the hospital or the ICU and found a strong positive association between this amnesia for early events in their hospital course with the level of PTSS reported using the Posttraumatic Symptom Scale-14 (Granja et al., 2008). A systematic review of studies conducted on ICU patients by Wade, Hardy, Howell, and Mythen (2013) found the use of benzodiazepines and incidence of delirium to be the most consistently correlated with the development of PTSD symptoms reinforcing the importance of the regular use of daily awakening protocols in ICUs.

Negative Health Outcomes Associated With PTSS

The mechanisms that link PTSS with poor health outcomes are multifactorial. However, as mentioned earlier, alterations in the HPA and SAM axes are commonly linked to PTSD pathophysiology. Autoimmune dysfunction is also found in these patients

and often linked to abnormal cortisol levels and cytokine response. Finally, patient with PTSD often engage in risky health behaviors further complicating these biologic processes.

Associated disorders.

A heightened stress response is known to lead to cardiovascular complications due to HPA and SAM activation that leads to hypertension and tachycardia. If this stress state is prolonged, these cardiovascular changes cause damage to vessels and eventually atherosclerosis; a hardening and narrowing of the artery which is associated with myocardial infarction and embolic stroke. Additionally, the dysregulation of the immune system associated with PTSS puts individuals at risk for autoimmune diseases. These physiological changes associated with PTSS place these patients at greater risk for morbidity and mortality than those without clinically significant stress levels (Boscarino, 2008). Furthermore, increased anxiety levels in acute myocardial infarction patients has been associated with a longer length of hospital stay and more complications such as acute ischemia, sustained ventricular tachycardia, ventricular fibrillation, reinfarction, and in-hospital death (Abu-Ruz et al., 2011).

The association between stress and PTSS and cardiovascular disease is well established. A large prospective cohort study of male veterans found those with PTSS were at higher risk for coronary heart disease (CHD) after controlling for depression, a confounding risk factor of CHD (Kubzansky, Koenen, Spiro, Vokonas, & Sparrow, 2007). Heart disease has been well studied in the male population but less is known about what stress does to women cardiovascularly despite the fact PTSD occurs more frequently in women than men. Another prospective cohort study of over 1,000 women

found women with PTSS were at greater risk for CHD morbidity and mortality than women without PTSS. This study also controlled for depression and trait anxiety which also are associated with CHD (Kubzansky et al., 2009).

In addition to cardiovascular disease, a survey of over 36,000 Canadians found PTSD to be associated with chronic pain, respiratory diseases, gastrointestinal disorders, cancer, and higher rates of disability (Sareen et al., 2007). Arthritis is another chronic condition strongly and consistently linked to PTSD (Qureshi, Pyne, Magruder, Schulz, & Kunik, 2009). Other autoimmune disorders, specifically psoriasis and hypothyroidism, are also correlated with PTSS (Boscarino et al., 2004).

PTSS and risky health behaviors.

To further complicate the health status of patients suffering from PTSS, they are also known to engage in more risky health behaviors such as cigarette smoking, alcohol use, and drug use (Rheingold, Acierno, & Resnick 2004). These behaviors not only are ineffective coping mechanisms in dealing with their anxieties but exacerbate any existing physical conditions they might be suffering from, as well as put them at risk for disease, specifically cardiovascular diseases. Moreover, these individuals tend to utilize the medical system more than non-traumatized people but underutilize preventative medical services (Rheingold et al., 2004).

Negative Psychological Outcomes Associated With PTSS

The link between PTSD and concomitant psychological disorders is well researched and documented in the DSM-V. Patients with PTSD are 80% more likely to have concomitant disorders such as depression, substance-related disorders, panic

disorder, phobias, generalized anxiety disorder, obsessive-compulsive disorder, and bipolar disorder (American Psychiatric Association, 2013). In the National Comorbidity Survey, primary PTSD was found to be associated with increases in affective disorders such as depression, mania, anxiety, and panic. It is also linked to increased rates of substance use disorders and suicide rates (Pietrzak et al., 2011).

Patients with PTSD have an increased rate of suicidal ideation and attempts (American Psychiatric Association, 2013). Moreover, if patients with PTSD also suffer from depression they are at an even higher risk for suicidal behaviors (Sareen et al., 2005). Development of depression and other psychiatric disorders in patients suffering from PTSS is concerning as it will only exacerbate existing deficits in the patient's ability to carry out health maintenance behaviors. Furthermore, these disorders are associated with various health risks themselves. In a population of patients who are already vulnerable due to their critical illness and have PTSS, the risk of developing another psychiatric disorder also increases the potential onset of chronic physical conditions and exacerbations of existing conditions.

PTSS and Decreased Quality of Life

ICU survivors without PTSD are well known to have a decreased QOL compared to the general population due to the limitations and obstacles they face as part of their physical recovery (Jackson, Mitchell, & Hopkins, 2011). When patients recovering from a critical illnesses or trauma also have PTSS, it makes it more difficult to function normally in society and interpersonally. Numerous studies have looked at QOL and HRQOL in this population and have all shown marked decreases in the QOL of

individuals with PTSD compared to those without PTSD who were admitted to the ICU (Dowdy et al., 2005; Girard et al., 2007; Myhren et al., 2010).

One of the major ways this decrease in QOL is manifested is in the inability to return to work. In a prospective follow-up study of patients one year after discharge, Myhren and colleagues (2010) found that only half of these patients were able to return to work or school and PTSD was cited as one of the reasons for this inability to regain the level of productivity they had prior to their hospitalization. The DSM-V states PTSD is also associated with absenteeism from work and increased medical utilization (American Psychiatric Association, 2013). Mirroring the DSM; Cheung and colleagues (2006) found PTSD was stated as a reason participants were not returning to work and as the cause of hospital readmission for a small group of patients.

Facilitating Coping in Patients With PTSS

General population.

PTSD is often treated with a combination of therapy and medication. The therapy most commonly used is cognitive behavioral therapy (CBT), a model that states the way one perceives an event influences the emotions one has about the situation. The patient meets with a therapist weekly for approximately three to six months of treatment. Additionally, group or family therapy might be utilized if the patient and therapist believe it would a helpful adjunct to CBT or if the family is also suffering as a result of the patient's PTSD (United States Department of Veteran Affairs, 2013). Selective serotonin reuptake inhibitors (SSRIs) are the most commonly used antidepressant to treat PTSD and are the only FDA approved medication (Jeffreys, 2012). Examples of SSRIs are sertraline and paroxetine.

Critical care population.

To date there are no interventions performed with the intent to reduce PTSS in ICU patients. However, some procedures performed for other reasons may reduce the incidence of PTSS but further research is required. There may be some benefit to altering the environment and culture of the ICU for patients at risk for PTSS, as well as for ICU patients in general.

Restraint use.

Restraint use has been associated with increased rates of PTSS as mentioned earlier. However, no research has been done to illustrate if restraint use versus having a patient under constant observation is more beneficial in reducing PTSS. Restraint use might simply be associated with PTSS as a byproduct of the patient being agitated; a factor more strongly associated with PTSS in ICU patients. However, level of sedation is also correlated strongly with the development of PTSS, therefore over sedating a patient to avoid agitation presents a problem as well. What has been illustrated to reduce PTSS regarding sedation is the practice of daily awakening trials in which sedation is turned off at one point during the day to assess the patient's cognitive status. If the patient still requires sedation, based on the hospital's protocol, it is restarted at half the previous amount and titrated by the patient's symptoms thereby potentially reducing the amount of sedation the patient receives, if appropriate.

Sleep deprivation.

Sleep promotion in ICU patients has also been a popular topic in research as it has been found the sleep deprivation these patients experience while in the ICU leads to a condition called ICU delirium which has been shown to increase complications and

mortality of patient in the hospital (Ely et al., 2004). ICU delirium, because of the negative health outcomes it is tied to, is now being closely monitored in many ICUs throughout the United States. The Confusion Assessment Method for the ICU (CAM-ICU) can reliably be administered by bedside nurses (Pun et al., 2005). The information obtained from this assessment is then used to treat the patient's delirium, often pharmacologically. Delirium and the formation of delusional memories is also being tied to PTSD in this patient population. However, the association between sleep deprivation, ICU delirium, and PTSD has not been demonstrated.

β-Blockers.

The link between exogenously administered catecholamines, like norepinephrine, and PTSS is still under investigation but further support for its association with the disorder can be found in research examining the relationship between β-adrenergic antagonists, like propranolol, and its link to PTSS. It was found in a group of patients receiving β-blockers, there were significantly lower scores on the PTSS-10, as well as fewer traumatic memories compared to the group who did not receive the medication (Schelling et al., 2003). This research also correlates with findings from studies looking at the effects of β-adrenergic blockade in a rodent model. One study found rats receiving a propranolol infusion directly into the amygdala prevented consolidation of fearful memories and allowed for extinction of the fear response versus the control group of rats who's noradrenergic activity was left unchecked (Dębiec, Bush, & LeDoux, 2011).

Hydrocortisone.

Human and rodent models have both illustrated that glucocorticoids potentiate memory consolidation for emotionally salient memories, specifically fearful memories.

Stress doses of hydrocortisone have been found to have a protective effect against PTSD in ICU patients (Schelling, Roozendaal, & Quervain, 2004).

What makes prevention of PTSS in this population challenging is that the interventions or conditions that are associated with the development of PTSS, such as mechanical ventilation, sedation, vasopressors, and even restraint use, are often necessary to keep the patient alive. There are ways hospitals can mitigate the effects of these procedures, such as with daily awakening protocols or by hiring bedside sitters instead of using physical restraints to prevent a patient from pulling a central line or endotracheal tube but they are also seen as an added expense. In regards to administering medications, such as β-adrenergic blockers or hydrocortisone, more research needs to be done around the risks associated with these medications in a critically ill population. For example, administering a β-adrenergic blocker in a patient who is severely hypotensive and requiring vasopressors would be contraindicated.

Diaries and self-help manuals.

There is growing evidence a diary of the patient's ICU experience kept by nurses and family members helps fill in gaps in the patient's memory surrounding their ICU stay. A large multicenter, randomized study implemented ICU diaries in which the nurses and family wrote daily entries and included photographs of the patient during their hospitalization, found the incidence of new PTSD in the treatment group to be 5% versus 13% in the group that did not receive a diary (Jones et al., 2010). A smaller study of 36 adult ICU patients had similar results. Patients who had a diary of their ICU stay kept by nurses had significantly lower levels of depression and anxiety (Knowles & Tarrier, 2009). Additionally, Garrouste-Orgeas and colleagues (2012) found in a sample of 143

medical/surgical ICU patients and their families that a diary kept by relatives and hospital staff reduced PTSD symptoms in both the ICU patients and their family members at three to twelve months after their ICU stay. It is hypothesized that giving them this frame of reference assists them in coming to terms with their experience and reinforcing real memories versus delusional memories. In regards to self-help manuals, a randomized controlled trial found manuals were helpful in physical recovery and reducing the incidence of depression but not with reducing PTSS (Jones et al., 2003)

The Value of Early Identification

The value in identifying and treating post-ICU patients with PTSS early is to avoid the physical and psychological comorbidities mentioned earlier. In doing so the individual's quality of life and productivity should improve and their need for further medical and psychiatric care should be more like what is seen in the post-ICU population without PTSS. One way to achieve this is by incorporating a psychology consult for ICU patients prior to discharge from the unit. A large observational study of trauma ICU patients implementing this intervention showed 21% had PTSS in the intervention group versus 57% in the control group. Those requiring medications one year after discharge were primarily from the control group versus the intervention group (41% versus 8%) (Peris et al., 2011).

Providing follow-up after discharge is also helpful as long as it occurs in a timely manner. In a study conducted by Schandl et al. (2011), post-ICU patients (n = 61) were invited to a multidisciplinary follow-up visit with a physical therapist, nurse, and physician assessing physical and psychological recovery. Those who attended the visits at three and six months after their hospital discharge required little ongoing treatment 12

months after their ICU discharge. Additionally, they found that screening tools were helpful in identifying undiagnosed depression and PTSD.

The importance of the ICU team and the patient's outpatient primary care provider assuming the responsibility of screening these patients for PTSS is most people with PTSD will not seek treatment for the disorder (Kessler et al., 1994; Kessler et al., 1995). This is potentially due to the stigma still associated with mental disorders or a result of avoidance symptoms seen in patients suffering from PTSD. By screening these patients in the hospital or during outpatient follow-up appointments, it is more likely these patients will be identified and treated. It is also hoped that by shedding light on PTSD in this population, medical professionals can help patients cope better with their emotions by normalizing their experiences. By improving the patient's coping mechanism via early treatment of PTSS, the patient's body will down regulate their stress response and thereby decrease many of the negative physical outcomes associated with PTSS/PTSD.

What is Unknown About PTSS in the ICU Population

Risk factors associated with PTSS like gender, age, days of mechanical ventilation, and delusional memories are still under investigation. The pathophysiology and disease process of how a patient develops PTSS as a result of their ICU experience is undetermined. Therefore, changes in practice specifically aimed at reducing PTSS remain unclear.

What is known is PTSS carries with it an increased risk for a variety of physical and psychiatric disorders and treating a patient's PTSS early improves his overall health,

QOL, and productivity. It is unknown to what degree post-ICU patients are being screened and/or referred to treatment for PTSS after recovering from their critical illness.

Chapter 3

Methodology

Purpose of the Study

Critically ill patients receiving care in the ICU are at greater risk for subsequent PTSS. The purpose of this study was to identify ICU patients at risk for PTSS and determine if they're being screened and referred to treatment. Further this study explored person and environmental factors that may increase risk for development of PTSS in this vulnerable population. As an exploratory aim, the feasibility of using the PTSS-14 to identify ICU patients at risk for PTSS was described.

Research Aims

1. Identify screening and educational experiences related to PTSS.
2. Describe the person and environment factors related to increased risk for PTSS.
3. An exploratory aim was to determine the feasibility and acceptability of a screening instrument to identify PTSS.

Research Design

A cross-sectional descriptive correlational design was used for this study. Cross-sectional designs involve collecting data at one time point to describe relationships at that fixed time. A correlational design is utilized when researchers want to examine relationships between variables. Further, there is no control over the independent variable by the researcher as the independent variable has already occurred by the time consent is obtained from the participant (Polit & Tatano Beck, 2012).

Procedures

Sample and sampling.

A convenience sample of men and women who received care in a 13-bed medical ICU and a 20-bed surgical ICU at a tertiary level academic medical center in southern California were recruited for this study. The medical ICU discharges or transfers home approximately 105 patients a month. Men and women who (a) were at least 18 years of age, (b) were able to read and understand English, (c) had no diagnosis of PTSD prior to this hospitalization, (d) had an ICU stay > 24 hours were included. Patients were excluded if they had a history of traumatic brain injury, current altered mental status or delirium, or currently in state custody. Participants were mailed a $10.00 gift card upon completion of the study to compensate them for their time.

A sample of 85 participants was the target enrollment for this study based on setting an apriori significance level of .05, a power of .8, and effect size of .3.

The following steps were taken to recruit participants in this study:

1. The researcher obtained approval from the ICU managers to recruit patients from their units. The hospital-wide manager's meeting was attended by the researcher to gain approval of managers from other units (telemetry, intermediate, medical-surgical) as patients wouldn't be approached until stable and therefore transferred out of the ICU.
2. Potential participants were identified once they received discharge or transfer orders out of the ICU. These patients were then approached about the study by the researcher once they had been extubated and off sedation for at least 24 hours. If the patient was interested, the researcher left an informed consent for the patient to review, as well as her contact information or came back the next day if the patient preferred.
3. If the patient agreed to participate in the study the researcher reviewed the informed consent with the participant and answered any questions prior to having the patient sign the consent form. The participant's phone number was obtained to contact the patient for the phone interview after discharge.
4. The researcher reviewed the patient's medical record and collected information stated in the medical chart abstraction form. The date of discharge was obtained in order to determine when the participant was two to four weeks post discharge and within the time frame for the telephone interview.

Data collection procedures.

Once informed consent was obtained, each participant was assigned a study number which was used on their study documents. The participant completed the FSSQ

and answered demographic questions. The medical chart was reviewed for data collection by the researcher. All data collected from the medical records was stored on a password protected thumb drive and de-identified. Original informed consents, study documents, medical record numbers, and participant's contact information were stored by the researcher in a locked cabinet. All identifying information was destroyed as soon as data was collected. Participants were contacted via telephone by the researcher two to four weeks after their discharge from the hospital. If the participant was available he/she completed the PTSS-14 and the Screening Experience Questionnaire. The phone interview lasted approximately 15 minutes. If the participant was not available or did not answer the phone three times within two to four week window, the participant was considered lost to follow-up. If given permission, the researcher left a voice message for the participant asking him/her to return the phone call at their convenience. All data was kept in a secure-locked cabinet and password protected thumb-drive.

Measures

Dependent variables.

Posttraumatic stress symptoms (PTSS).

PTSS is defined as the presence of most, or all, of the symptoms needed to meet criteria for a diagnosis of PTSD prior to 30 days based on the PTSS-14 score, which is a screening tool versus a structured clinical diagnostic interview.

Screening experience.

Screening experience is defined as the extent to which study participants were assessed for, and educated about, PTSD/PTSS after recovering from their critical illness by a nurse or physician. This was evaluated by the Screening Experience Questionnaire.

Independent variables.

Person factors.

Age, gender, and past medical and psychiatric history.

Population descriptors.

Marital status, socioeconomic status, level of education, race, and ethnicity.

Social support.

Social support is the degree to which a person has someone in their life to discuss important life matters (Confidant support) as well as the degree of emotional support or caring an individual experiences (Affective support). Social support was measured using the Duke-UNC Functional Social Support Questionnaire (FSSQ).

Treatment factors.

Length of stay in the ICU.

The number of days starting from admittance to the ICU to discharge from the ICU. If the patient was readmitted to the ICU after being transferred out during the same hospital stay, this was recorded as a separate number of days in the ICU.

Sedation.

The name(s) of sedation medication used, as well as the dates these medications were used and the dosage range.

Restraint use.

The type of restraint (wrist, ankle, mitten, etc) used and duration.

Daily awakening.

The number of days a daily awakening was performed compared to the number of days on sedation.

Exogenous catecholamines.

The name(s) of exogenous catecholamines used, as well as the dates these medications were used and the dosage range.

β-blockers.

The name, dosage, and frequency of medication used.

Agitation.

Measured by the Richmond Agitation-Sedation Scale (RASS). A 10-item scale ranging from +4 "combative" to -5 "unarousable". The RASS is a highly valid and reliable tool (Ely et al., 2003) noted for its high interrater reliability (kappa = 0.956) (Sessler et al., 2002). The RASS score was collected as a daily range from the lowest to highest within a 24 hour period.

Delirium.

Measured twice a day by the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) score. Found to be a valid and reliable tool with high interrater reliability (Kappa = 0.96) (Ely et al., 2001).

Mechanical ventilation.

Measured by the date of intubation and date of extubation. If there were multiple intubations during this hospital stay, each was recorded separately.

Use of continuous renal replacement therapy (CRRT).

Use of this machine during the ICU stay was extracted from the medical records.

Instruments

For the purposes of this study, three instruments were used for data collection.

Posttraumatic Stress Syndrome 14-Questions Inventory (PTSS-14).

The PTSS-14 is a 14-item questionnaire developed from an earlier tool, the PTSS-10. The need to expand the PTSS-10 resulted from its lack of items on numbing, flashbacks, and avoidance symptoms characteristic of PTSD as defined by the DSM-IV-TR. The 7-point Likert-scale questions are rated from 1 (never) to 7 (always). Total scores range from 14 to 98 with higher scores indicating more PTSD symptoms. This scale has been validated in ICU patients with a high concurrent validity ($r=0.86$) compared to the PTSD Diagnostic Scale (PDS). Receiver operator characteristic demonstrated high sensitivity (86%) and specificity (97%) with an optimal cut off of 45 points to diagnose PTSD. Internal consistency at 4-14 days post-discharge was high at 0.89. (Twigg, Humphris, Jones, Bramwell, & Griffiths, 2008) (Appendix A)

Duke-UNC Functional Social Support Questionnaire (FSSQ).

The FSSQ is an 8-item questionnaire designed to measure functional elements of social support. A 5-point Likert scale is used to rate questions from 1 (much less than I would like) to 5 (as much as I would like). The instrument is broken down into two dimensions of perceived emotional support: confidant and affective support. Confidant support includes five questions that reflect the level of social interaction and support the individual receives, for example, having someone to talk to about major life problems.

Affective support includes three questions assessing the emotional component of social support such as receiving love and affection. The average test-retest correlation is 0.66. For both scales construct validity, concurrent validity, and discriminant validity have been demonstrated (Broadhead, Gehlbach, De Gruy, & Kaplan, 1988). (Appendix A).

Screening Experience Questionnaire.

The investigator developed Screening Experience Questionnaire was used to collect demographic data such as level of education, race, ethnicity, socioeconomic status, and marital status. Questions regarding the participant's experiences as an in-patient and out-patient with provider screening for, and education about, PTSD will be asked, as well as questions on the feasibility and level of respondent burden of administering the PTSS-14 in this group of patients. (Appendix A).

Analysis

In order to achieve the first and third aims, descriptive statistics were computed. Descriptive statistics were also used to describe the sample. To achieve the second aim, inferential statistics were used to test relationships between PTSS-14 scores and the independent variables. Parametric statistics (Pearson correlations and one-way ANOVA) were used to evaluate relationships between continuous variables; nonparametric statistics (Chi-square and point biserial) were used to evaluate relationships between categorical variables. The statistical software package SPSS for Windows was used. Qualitative information describing stress coping strategies was summarized, and explored in relation to levels of higher versus lower PTSS-14 scores.

Human Subjects Protection

The proposal was reviewed by the Institutional Review Board (IRB) of the University of San Diego and the University of California, San Diego. The researcher developed an informed consent that all participants reviewed and signed prior to participating in the study. All participants were assured that their participation in the study, or refusal to participate, would not affect any medical treatment or care they received. Participants received a signed copy of the informed consent for their records that contained the contact information of the researcher.

Strengths

This prospective study utilized a valid and reliable tool; the PTSS-14 to collect data, participants with a wide variety of diagnoses were included and there was a low attrition rate. Further, the study addressed an important gap in knowledge about screening for PTSS in a population at high risk for the development of long-term PTSD.

Limitations

Elements of this study that limit its generalizability are the small sample size and use of a convenience sample from a single site. PTSS-14 should be evaluated in a sample with lower literacy levels and lower levels of social support because of the high education-level and high level of social support of this sample. Statistical significance was not reached with many variables due to sample size. Patients who remained confused during their hospitalization had to be excluded from participation and medical records of psychiatric history may not have been complete.

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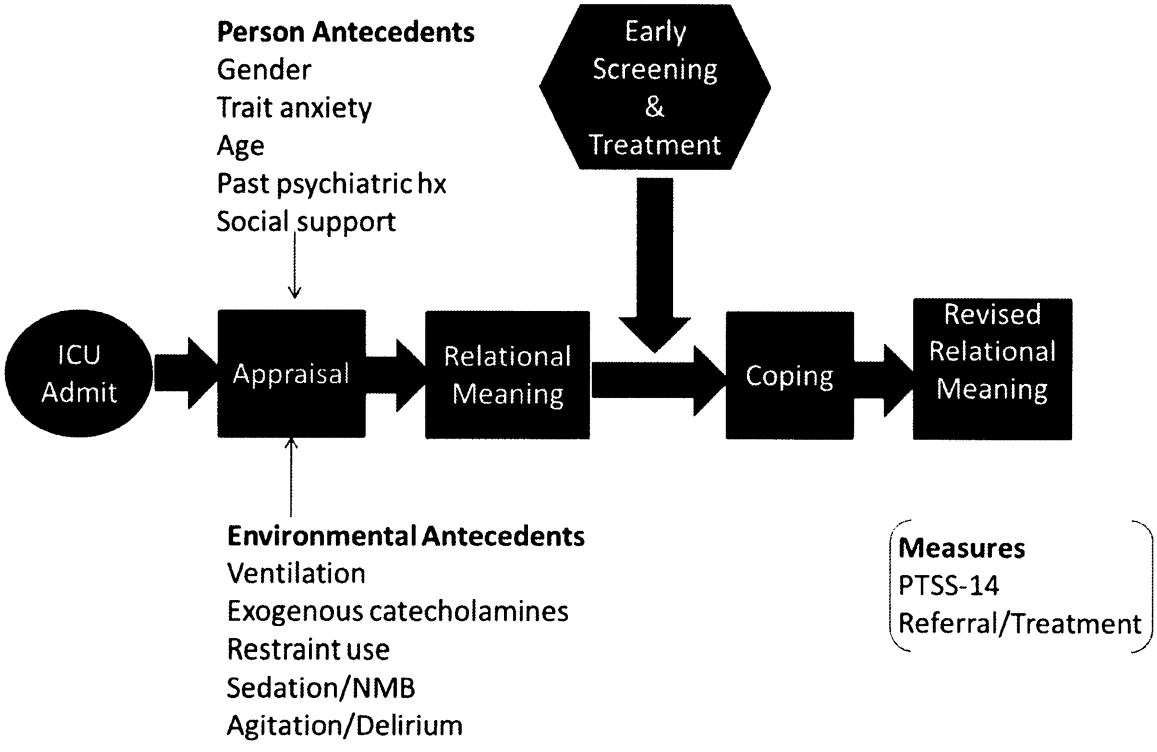
Figure 1. Theoretic framework adapted from Lazarus and Folkman's Transactional Theory of Stress and Coping (1984).



ICU-related PTSD; The Importance of Nurse Involvement.

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Key words: PTSD; ICU; nursing.

Abstract

More patients in the intensive care unit (ICU) are surviving their critical illnesses due to advancements in medical care. This has led to an increased awareness of the emotional consequences of being critically ill. Posttraumatic stress disorder (PTSD) has been identified in approximately 17% of the ICU population compared to 7% of the general U.S. population. Many risk factors, such as mechanical ventilation and sedation, and negative health outcomes are associated with ICU-related PTSD. The purpose of this literature review is to bring awareness of ICU-related PTSD to critical care nurses, examining current literature that addresses risk factors, negative health outcomes, and nursing roles in identifying patients at risk and reducing the severity of PTSD symptoms.

ICU-related PTSD; The Importance of Nurse Involvement.

Treatment of critically ill patients has improved to the point where an increasing number are surviving to be discharged home or to a long-term care facility to eventually make a meaningful recovery. This has led to an increased awareness of the emotional and physical consequences of life-saving interventions. Post-traumatic stress disorder (PTSD) is a severe anxiety disorder that results when an individual experiences or witnesses trauma. The disorder is characterized by re-experience of the traumatic event via flashbacks or nightmares, as well as autonomic nervous system arousal, which can manifest as difficulty sleeping, irritability, and exaggerated startle response. Individuals with PTSD also report a numbing feeling and tend to avoid places, people, and situations associated with the trauma.[1]

The intensive care unit (ICU) patient population is particularly at risk for PTSD due to their fragile physical state, alterations in mental status, and increase in stress response as a result of a critical illness or injury. Unfortunately, many health care professionals are unaware of the psychological and physical consequences that can occur as a result of surviving a critical illness and the effects these consequences can have on recovery and quality of life. The purpose of this literature review is to introduce the phenomena of ICU-related PTSD and review the risk factors and negative health outcomes associated with the disorder to assist nurses to recognize and reduce PTSD symptoms in their patients.

Prevalence of PTSD

Posttraumatic stress disorder is estimated to affect 6.4% to 8.7% of adults in the United States.[1,2] The prevalence of PTSD in the ICU has been difficult to determine, with estimates ranging from 0% to 64%. This wide variation has been attributed to small study

sample sizes, high study participant dropout rates, and the use of a wide variety of assessment measures, such as screening tools versus diagnostic tools.[3]

A cohort study designed to address these methodological issues was conducted using a sample of 829 randomly selected participants at multiple centers over a 2 year period.[4] ICU patients were assessed for PTSD 12 months after their injury using the Clinician Administered PTSD Scale (CAPS-IV), a valid and reliable structured clinical interview. Seventeen percent of patients in the year following their ICU discharge met diagnostic criteria for PTSD. Only 7% of patients in the control group, trauma patients not admitted to the ICU, met criteria for PTSD, congruent with PTSD estimates for the general population. This rigorous study provided a sound estimate of the current prevalence of PTSD in the post-ICU patient population.

These numbers illustrate the ICU population is at higher risk for developing PTSD than the general population. The Society of Critical Care Medicine estimated that five million people in the United States each year will be admitted to an ICU.[5] Adding to the significance of this problem is the confluence of a growing demand for ICU services driven by an aging population requiring acute complex care.

Personal Factors Associated with Increased PTSD Risk

Some PTSD risk factors are inherent in certain patients; it is important for the nurse to identify early on factors associated with the development of PTSD in this high risk population. Younger individuals and females are at a higher risk than those over 65 years of age or of male gender. [6,7,8,9] The factors that predispose women to a greater risk of developing PTSD are not well understood. The difference between PTSD rates in men

and women is not accounted for in the higher rates of depression and anxiety or sexual assault experienced by women.[10] Patients with pre-ICU anxiety and depressive disorders have also been found to have a higher rate of PTSD following discharge from the ICU than those without a psychological history.[11] Finally, pessimistic individuals are more likely to experience PTSD symptoms than patients with a more positive outlook.[12]

A literature review including 11 studies evaluating the association between PTSD and perceived social support after trauma found individuals reporting higher levels of perceived social support had lower levels of PTSD. This association became stronger over time suggesting that social support could be a type of tertiary prevention or that the effects of social support are cumulative.[13] Similarly, Thrasher and colleagues, found individuals who had more social support had better treatment outcomes than patients with poor social support. [14] Therefore, the level of support the patient has from friends and family should be assessed by the nurse throughout the hospitalization continuum. Nurses can also encourage family involvement during the patient's hospitalization by facilitating 24 hour visitation in the ICU, family participation in rounds, and family meetings with physicians and nurses.

ICU Factors Associated with Increased PTSD Risk

The treatment factors and environment associated with the ICU placing a patient at risk for developing PTSD are still under investigation. However, it is important for nurses caring for these patients, both in the ICU and after transfer from the ICU, to understand these risk factors in order to decrease the effects of these risks in the ICU and promote early identification and referral of patients with PTSD. Categories of ICU risks

for PTSD include medications such as vasopressors and sedation, delusional memories of the ICU, ICU-delirium, agitation, and mechanical ventilation.

Vasopressors

Research is showing a link between the dosage of vasopressors and the intensity of PTSD symptoms.[15,16] Vasopressors, such as phenylephrine and norepinephrine, are often administered in the ICU to counteract profound hypotension due to cardiac or vascular failure or systemic infections. Physiologically, these medications mimick the stress response for extended periods of time; acting on target organs such as the heart to increase heart rate and contractility. In addition, blood vessels constrict, bronchioles expand, and blood is diverted away from non-essential areas, such as the gastrointestinal tract and peripheral circulation, allowing higher volumes of oxygen to reach vital organs.

Using vasopressors for an extended period creates a chronic stress state, putting the body at risk for excessive systemic inflammation leading to immune and metabolic disregulation, endothelial damage, cytokine imbalance, carbohydrate intolerance, dyslipidemia, and insulin resistance.[17] There is also evidence linking abnormalities of cortisol and cytokines in the hippocampus to memory impairment due to their effects on neural plasticity. The physiological mechanism by which this occurs is still unclear and continues to be under study.[18,19] Despite the uncertainty as to the physiologic mechanism behind this memory impairment, it is a common finding associated with individuals diagnosed with PTSD and is believed to be a major factor in the development of PTSD and maintenance of its symptoms.[20]

Further support for the link between the stress response mimicked using vasopressors and PTSD can be found in research examining the relationship between β-adrenergic antagonists, like propranolol, and its link to PTSD. Schelling el al. found patients receiving β-blockers had significantly lower levels of PTSD symptoms, as well as fewer traumatic memories, compared to those who did not receive the medication. [16] Physiologically, this makes sense because β-blockers inhibit the physical manifestations of stress such as heart rate and blood pressure.

Sedation

Sedation is the use of medications, such as benzodiazepines or other anesthetic agents, to reduce a patient's consciousness for a period of time. Sedation is used to make procedures or operations more comfortable for the patient, reduce agitation, and decrease oxygen demand. In a literature review conducted by Davydow et al., higher levels of benzodiazepine use in the ICU was a "consistent predictor" of PTSD symptoms. [11] The total number of doses of lorazapam in this population was found to be positively correlated with PTSD symptoms. In addition, a greater number of days spent sedated or having a neuromuscular blockade was associated with a higher incidence of PTSD.[21] Furthermore, benzodiazipines have an amnesic effect on patients, and amnesia has been positively correlated with higher levels of PTSD symptoms.[22] Despite the extent of research examining the role played by benzodiazapines, it is still unknown if they are a causative or associated factor in the development of PTSD.

The spontaneous awakening protocol used in ICUs to reduce the level of sedation and allow for assessment of neurologic status has been shown to improve patient

outcomes by reducing the days of mechanical ventilation and length of stay in the hospital.[23] To conduct a spontaneous awakening trial, the patient must not have active seizures, be in alcohol withdrawal, be receiving paralytics, have current signs of agitation or myocardial ischemia, and must have an intracranial pressure within normal limits. If these criteria are met, the nurse will discontinue all sedation and assess the patient's neurological status. If the patient experiences anxiety, agitation, pain, respiratory distress, or acute cardiac arrhythmias, the patient is considered to have failed the trial, and sedation will be resumed at half the previous rate and titrated accordingly.[24] In a randomized study, a similar protocol was shown to improve psychological outcomes and displayed a trend toward lower incidence of PTSD.[25] Research supporting spontaneous awakening trials is strong and gives the nurse a way to reduce the risk of PTSD in sedated patients.

Delusional Memories

Delusional memories are false memories of an event that tend to persist over time. ICU patients report unsettling delusional memories of their hospitalizations interwoven with real events from that time experienced as intrusive memories, such as flashbacks or nightmares.[26] Delusional memories are strongly associated with development of PTSD in this population and are more likely to be retained over time than factual memories. Unfortunately, factual memories of real events are less emotionally salient to the individual and, therefore, decrease over time leaving the emotionally charged delusional memories as the primary memories of the ICU experience.[27] A common belief among ICU nurses is that no memory of the ICU is preferable for patients. In actuality, a large multicenter study found nearly half of their participants had no memory of their

admission to the hospital or the ICU and found a strong positive association between this amnesia for early events in their hospital course with the level of PTSD reported.[22] Sedation is also correlated with delusional memories in the critically ill patient providing more evidence associated with PTSD.[27]

ICU Delirium

The noise level of the ICU and continuous supervision of patients interferes with restful sleep. Combined with the stress of the critical illness on the patient's body, the lack of sleep can contribute to ICU delirium, placing the patient at risk for PTSD.[28,29] Simple tools nurses can use, such as earplugs and eye masks can improve sleep quality and the patient's sleep perceptions.[30,31] Reducing noise levels by decreasing talking at night, closing doors, and repairing noisy equipment are also cost-effective ways to promote sleep. ICU delirium has also been shown to increase complications and mortality among patients in the hospital.[32] ICU delirium, because of its association with negative health outcomes, is now being closely monitored in many ICUs using the Confusion Assessment Method for the ICU (CAM-ICU) which can reliably be administered by bedside nurses.[33] The information obtained from this assessment is then used to treat the patient's delirium, often pharmacologically. Sleep promotion and consistent use and monitoring of the CAM-ICU are nursing interventions that can mitigate the effects of PTSD.

Agitation

The literature demonstrates that episodes of agitation and restraint use are associated with PTSD.[11] In the ICU, patients are restrained to prevent them from

removing life sustaining devices such as endotracheal tubes, or if they are highly agitated or aggressive and pose a safety risk to themselves or staff. Agitation is often managed first with sedative medications or "chemical restraints". However, for patients in which sedation is contraindicated physical restraints are used as a last resort. Factors such as restraint use and agitation require more research. Yet, the few studies conducted show strong associations between these variables and PTSD in patients discharged from the ICU, highlighting the importance of treating agitation and reducing restraint use if possible.[27,34] It is important for the ICU nurse to treat agitation. determine if the restraints are contributing to the agitation, and find other options. However, as mentioned earlier, high levels of sedation are also correlated with the development of PTSD, therefore over-sedating a patient to avoid agitation presents a problem as well.

Mechanical Ventilation

Not surprising to many ICU nurses is the finding that duration of mechanical ventilation has been shown to be a potential risk factor for PTSD in patients who survive acute lung injury/acute respiratory distress syndrome (ALI/ARDS).[11] However, the link between PTSD and mechanical ventilation is still unclear among ICU patients hospitalized for other reasons.[35,8] Therefore, mechanical ventilation remains a serious risk factor as many ICU patients develop ALI or ARDS. In intubated patients, nurses have an opportunity to advocate for interventions that promote extubation, such as spontaneous breathing trials and early mobilization.

Severity of Illness and Length of Stay

Two factors that have been suspected to be major contributors in the development of PTSD in the ICU population are severity of illness and length of stay. However, length of stay and severity of illness have not been consistently associated with the development of PTSD in the critically ill population.[11,8,36,7] Most likely, it is the patient's perceptions of the experience that contributes to PTSD and not the length of the ICU stay or severity of illness.

This combination of disease, sedative medication, and environmental stressors can prevent the individual from forming real memories of the event, leaving the patient with no memory of their hospitalization or delusional memories and nightmares.[20] Many of these risk factors, such as the need for mechanical ventilation and vasopressors, cannot be mitigated by the nurse. However, interventions such as the daily awakening trial, aggressively titrating down vasoactive medications, routinely assessing the patient for extubation, promoting sleep, and treating delirum and anxiety can reduce the risk for PTSD or the severity of PTSD symptoms.

Negative Health Outcomes Associated with PTSD

Mechanisms that link PTSD with poor health outcomes are multifactorial. Alterations in the hypothalamic-pituitary-adrenal axis (HPA) and sympathetic adrenal medullary (SAM) axes, as well as autoimmune dysfunction, are commonly linked to PTSD pathophysiology. Finally, patients with PTSD often engage in risky health behaviors, such as smoking and alcohol use, further complicating these biologic

processes. There are numerous negative health outcomes related to PTSD that can lead to chronic health conditions, complications, and longer lengths of stay in the hospital.

Cardiovascular Disorders

A heightened stress response has been shown to lead to cardiovascular complications due to HPA and SAM activation leading to hypertension and tachycardia. If this stress state is prolonged, these cardiovascular changes cause damage to vessels and eventually atherosclerosis, which is associated with myocardial infarction and embolic stroke. These physiological changes associated with PTSD place these patients at greater risk for morbidity and mortality than those without clinically significant stress levels.[37] Furthermore, increased anxiety levels in acute myocardial infarction patients have been associated with a longer length of stay and more complications such as acute ischemia, sustained ventricular tachycardia, ventricular fibrillation, reinfarction, and in-hospital death.[38] A large prospective cohort study of male veterans found those with PTSD were at higher risk for coronary heart disease (CHD) after controlling for depression, a confounding risk factor for CHD.[39] Another prospective cohort study of over 1000 women found women with PTSD were at greater risk for CHD morbidity and mortality than women without PTSD symptoms. This study also controlled for depression and trait anxiety, which are also associated with CHD.[40] Nurses need to be aware of this strong association between PTSD, stress symptoms, and cardiovascular disease and advocate for swift treatment of anxiety symptoms in providing patient care.

Other Associated Disorders

In addition to cardiovascular disease, there is also evidence linking PTSD with metabolic syndrome, a known cluster of cardiovascular symptoms that puts a person at risk for coronary artery disease (CAD), stroke, and type II diabetes.[41] This occurs through sympathetic nervous system activation leading to the release of hormones that increase the heart rate and blood pressure leading to atherosclerosis and a dampened immune response.[42]

A survey of over 36,000 Canadians found PTSD to be associated with chronic pain, respiratory diseases, gastrointestinal disorders, cancer, and higher rates of disability.[43] Arthritis is another chronic condition strongly and consistently linked to PTSD.[44] Other autoimmune disorders, specifically psoriasis and hypothyroidism, are also correlated with PTSD symptomatology.[45] If a critically ill patient develops PTSD while in the ICU, the prolonged stress response that occurs within the body can lead to poorer health outcomes and a longer recovery time for the admitting physical illness.[38]

Negative Psychological Outcomes Associated with PTSD

The link between PTSD and concomitant psychological disorders is well studied and documented in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). Patients with PTSD are 80% more likely to have depression, substance-related disorders, panic disorder, some phobias, generalized anxiety disorder, obsessive-compulsive disorder, and bipolar disorder than individuals without PTSD.[1] If patients with PTSD also suffer from depression they are at an even higher risk for suicidal behaviors.[46] Furthermore, these disorders are associated with various health risks themselves. In a

population of patients who are already vulnerable due to their critical illness and who also have PTSD, the risk of developing another psychiatric disorder also increases the potential for the onset of chronic physical conditions and exacerbations of existing conditions complicating their recovery and decreasing quality of life (QOL).

PTSD and Quality of Life

ICU survivors without PTSD are well known to have a decreased QOL compared to the general population due to the limitations and obstacles they face as part of their physical recovery.[47] When patients recovering from a critical illnesses or trauma also have PTSD, it makes it more difficult to function normally in society and interpersonally. One of the major ways this decrease in QOL is manifested is the inability to return to work. In a prospective follow-up study of ICU patients one year after discharge, Myhren and colleagues found that only half of these patients were able to return to work or school, and PTSD was cited as one of the reasons for this inability to regain their prior level of productivity. [12] The DSM-5 also associates PTSD with absenteeism from work and high levels of medical care utilization.[1]

Due to the stigma of PTSD and other psychological disorders in general, many patients with mental disorders, including PTSD, tend not to seek help for their illnesses.[48] Screening for this disorder at hospital discharge or during outpatient follow-up may be the most effective way to diagnose PTSD or other mental health disorders like depression, which commonly co-occurs with PTSD in the ICU population.

Coping in Patients with PTSD

There is evidence a diary of the patient's ICU experience kept by nurses and family members helps fill gaps in the patient's memory of their ICU stay. A large multicenter, randomized study implemented ICU diaries in which the nurses and family wrote daily entries and included photographs of the patient during the hospitalization. The incidence of PTSD in the group who had a diary kept for them was 5% versus 13% in the group that did not receive a diary.[49] It is hypothesized that giving patients this frame of reference assists them in coming to terms with their experiences and reinforces real memories versus delusional memories. It is also a way nurses can decrease PTSD symptoms in their patients and connect with patients and their families during a difficult time.

The Value of Early Identification

PTSD carries with it an increased risk for a variety of physical and psychiatric disorders, and treating a patient's PTSD early improves their overall health, QOL, and productivity. Nurses are in a position to facilitate early identification of post-ICU patients at risk for PTSD to help them avoid the physical and psychological comorbidities mentioned earlier, thereby improving their quality of life and productivity. One way to achieve this is to develop a screening tool based on elements in a patient's electronic medical record (EMR). A study of 878 EMRs of trauma survivors identified 10 data elements that assisted in the prediction of PTSD in the population. Most of the data elements used the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9CM) and were found to include PTSD, psychiatric disorders, and

substance use. Other data elements that increased the risk for PTSD were female gender, race/ethnicity, ICU admission, prior trauma, and socioeconomic factors such as insurance status.[50] The benefit of using the EMR to screen patients is that it can be done anytime and does not involve a patient screening tool, which might be an inconvenience for busy nurses.

Another option to facilitate early screening is to incorporate a psychology consult for ICU patients prior to discharge from the unit. A large observational study of trauma ICU patients receiving this intervention showed a lower incidence of PTSD (21%) in the group receiving the psychology consult versus 57% in the group who did not meet with the psychologist. Those requiring medications one year after discharge were primarily from the control group rather than the intervention group (41% and 8%, respectively).[51]

Providing follow-up after discharge is also helpful as long as it occurs in a timely manner. In a study conducted by Schandl et al., post-ICU patients (n = 61) were invited to a multidisciplinary follow-up visit with a physical therapist, nurse, and physician to assess physical and psychological recovery. Those who attended the visits at 3 and 6 months after their hospital discharge required little ongoing treatment 12 months after their ICU discharge. In addition, it was found that screening tools were helpful in identifying undiagnosed depression and PTSD in the post-ICU population.[52]

It is imperative that patients discharged from the ICU are screened for PTSD and appropriate referrals made so they can receive proper treatment once discharged from the hospital. Currently, in the military and civilian populations, PTSD requires professional treatment such as cognitive behavioral therapy and psychotropic medications to facilitate

coping.[53] Further complicating the issue, most people with psychiatric disorders will not seek treatment for their disorder. This is potentially due to the stigma still associated with mental disorders or a result of avoidance symptoms seen in patients suffering from PTSD. Therefore, it is imperative that the ICU team or the patient's outpatient provider assume the responsibility of screening these patients for PTSD while they have them in the hospital or clinic.[48] Using EMR data, patient- or nurse-completed screening tools, or routine psychology rounds for all ICU patients are methods research suggests to identify patients early. Once the nurse has this information, he or she can work with the medical team and patient to facilitate early treatment of PTSD thereby down regulating the patient's stress response and decreasing many of the negative physical outcomes associated with PTSD.

By screening patients in the hospital or during outpatient follow-up appointments, it is more likely post-ICU patients at risk will be identified and treated. Early identification of PTSD is essential in preventing physical and psychological comorbidities. It is also integral to restoring social function, returning to work, and obtaining appropriate medical treatments for physical conditions. At this time, patients' psychological health is not being addressed after discharge from the ICU due to a lack of familiarity with the disorder in this population, as well as a lack of appreciation of the fact PTSD will further complicate patients' physical and mental recovery. It is also hoped that by shedding light on PTSD in this population, nurses can help patients cope better with their emotions during the hospitalization by educating patients about the disorder and incorporating ICU diaries as part of the standard plan of care.

Unfortunately, many of the risk factors for PTSD in the ICU population, such as vasopressors, cannot be eliminated as they are also the interventions used to save the patient's life. However, there are interventions nurses can perform, or advocate for, to make these treatments and the ICU environment less stressful and thereby promote recovery. Continually assessing the need for vasopressors and sedation using the daily awakening protocol regularly, reducing noise, promoting sleep by clustering nursing care and providing eye masks and earplugs, assessing the patient for delirium every shift and ensuring it is treated accordingly, facilitating extubation by advocating for spontaneous breathing trials, and early mobilization are all within the nurse's scope of practice and are evidence-based ways to decrease PTSD in ICU patients. Further, nurses are in a unique position to educate patients, families, and other medical professionals about this disorder as well as improve patient outcomes by utilizing interventions addressed in this review of literature.

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Concept Analysis of ICU-related PTSD

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Abstract

Aim. To report an analysis of the concept of ICU-related PTSD.

Background. Hospitals throughout the world are experiencing an increase in ICU admissions and rapid advances in new medical technology. The effects of new life-saving interventions on critically ill patients are not well understood; including the growing reports of post-traumatic stress disorder symptoms among patients who have received care in an ICU.

Design. Walker and Avant's eight-step model for concept analysis was used.

Data sources. A topical literature search of CINAHL, PubMed, Google Scholar, MEDLINE, dictionaries, books, and basic internet sources was conducted. Approximately 40 documents were included.

Methods. A review of the literature from 1960 to 2013 to produce defining attributes of ICU-related PTSD. Model, borderline, related, and contrary cases were created to assist in describing the concept and its uses.

Results. Antecedents to ICU-related PTSD are admission to, and treatment within, an ICU and patient perception of these treatments as life-threatening. The defining attributes of the concept include the DSM-5 criteria B-G. These symptoms lead to consequences of increased length of stay, complicated outpatient recovery, poor physical and mental health, and decreased quality of life compared to ICU patients without ICU-related PTSD.

Conclusions. ICU-related PTSD involves the development of specific stress symptoms as a result of experiencing life-saving interventions and medications in a critical care environment. By understanding this concept, nurses are in a unique position to improve patient outcomes in ICU-related PTSD.

Summary Statement

Why is this research or review needed?

- Each year more patients receive life-saving interventions in intensive care units (ICU), however, the consequences of these interventions are not well understood.
- Current research examining the phenomena of ICU-related PTSD is difficult to interpret and compare due to the lack of a defined concept.
- A concept analysis of ICU-related PTSD and similar, related concepts, such as acute stress disorder (ASD) and post-intensive care syndrome (PICS), is needed to facilitate more research and improve patient outcomes.

What are the key findings?

- The defining attributes of ICU-related PTSD include the DSM-5 B-G criterion.
- Required antecedents are receipt of care in an ICU and perception of the experience (ICU treatments and environment) as life-threatening.
- Consequences of ICU-related PTSD include a prolonged outpatient recovery, poor physical and mental health, and decreased quality of life.

How should the findings be used to influence policy/practice/research/education?

- By defining the boundaries of this concept, future research can be conducted to determine ICU-related PTSD prevalence rates and associated risk factors as well as to develop a psychometrically sound screening tool.
- Through understanding the concept nurses can be instrumental in promoting hospital-wide protocols to improve overall outcomes in ICU patients that not

only reduce the risk of ICU-related PTSD, but promote recovery when the patients are transferred to step-down units or medical-surgical units and in outpatient settings.

Keywords: post-traumatic stress disorder, PTSD, ICU, critical care, concept analysis, nursing

Concept Analysis of ICU-related PTSD

Introduction

Post-traumatic stress disorder (PTSD) is a severe anxiety disorder caused by experiencing or witnessing a traumatic event. PTSD comprises a cluster of symptoms characterized by intrusion symptoms such as nightmares or flashbacks; avoidance of things that remind the person of the event; negative changes in mood and cognition; and autonomic nervous system arousal often experienced as irritability, hypervigilance, or trouble sleeping (American Psychiatric Association [APA], 2013). The disorder has been recognized for centuries in veterans of war, yet it is a newer addition to the American Psychiatric Association's Diagnostic and Statistical Manual (DSM), having been added to the 3rd edition in 1980 (APA, 1980).

Diagnostic criteria and antecedent factors associated with PTSD continue to be revised with each edition of the DSM as more is learned about the disorder and its causative factors. In the current DSM-5, PTSD is described as resulting from direct exposure to, or witnessing, death or severe trauma, sexual violence, or severe illness. Medical events that meet criteria for PTSD are limited to "sudden" and "catastrophic" experiences, but not as a result of receiving life-sustaining interventions and medications in the intensive care unit (ICU). Despite this, PTSD is common in the ICU population, yet most clinicians remain unaware of ICU-related PTSD. Researchers and clinicians are beginning to define the disorder within the ICU population by determining prevalence and risk factors, yet there is still much confusion about what to call this cluster of symptoms and what can be done to reduce ICU patients' risk.

Prevalence

PTSD is estimated to affect 8.7% of adults in the United States (APA, 2013). Determining the prevalence of PTSD throughout the world is complicated, and the statistics are generally not comparable across countries due to differences in methodology and sampling (Kessler and Ustun, 2008). The prevalence of PTSD in the ICU has also been difficult to determine, with estimates ranging from 0% to 64% (Griffiths et al., 2007). This wide variation has been attributed to small study sample sizes, high study participant dropout rates, and the use of a wide variety of assessment measures, such as screening tools versus diagnostic tools (Griffiths et al., 2007).

A large randomized cohort study designed to address these methodological issues was conducted using participants at multiple centers over a 2 year period. ICU trauma patients were assessed for PTSD 12 months after their injury using a valid and reliable structured clinical interview. Seventeen percent (17%) of patients in the year following their ICU discharge met diagnostic criteria for PTSD. Only 7% of patients in the control group (trauma patients not admitted to the ICU) met criteria for PTSD, congruent with PTSD estimates for the general population (O'Donnell et al., 2010). This study provides a preliminary estimate of the current prevalence of PTSD in the post-ICU patient population. With an estimated 4.4 million patients admitted to the ICU annually in the United States, 17% represents a significant number of patients at risk for PTSD (Mullins et al., 2013). The prevalence of ICU-related PTSD will become more of an issue as the number of patients admitted to ICUs grows each year. Additionally, the older adult population continues to expand and hospitals are treating patients with more complications, comorbidities, and of much higher acuity than in past years.

Background

Researchers are taking an interest in PTSD in the ICU population and are examining what factors place patients at risk for developing the disorder and what can be done to mitigate these risks. Treatments unique to the ICU such as mechanical ventilation, sedation, and vasopressors have been associated with the development of ICU-related PTSD (Davydow et al., 2008; Schelling et al., 2003). However, little has been done to define PTSD in the context of the critical care setting or look at how, or if, it differs from the Diagnostic and Statistical Manual of Mental Disorders (DSM) (APA, 2013) diagnostic criteria. This is important since the DSM is the gold standard by which clinicians diagnose PTSD.

A literature review indicated most researchers determine that a patient has PTSD after ICU discharge using a self-report scale rather than a structured clinical interview (Griffiths et al., 2007). To further complicate the matter, researchers might not differentiate between PTSD, acute stress syndrome (ASD), or PTSD-related symptoms that are below the threshold for a diagnosis of PTSD. Ultimately, this leads to difficulty in interpreting study findings, estimating the prevalence of this disorder, and determining if these patients are exhibiting clinically significant PTSD, some of the symptoms of PTSD, or another stress disorder.

The DSM diagnosis of PTSD itself is lacking in regard to critical care as a contributing factor. The DSM requires that there is an actual or immediate threat to one's physical integrity in order to meet diagnostic criteria. However, in the ICU setting, the medical and nursing interventions that contribute to PTSD are not threatening the

patient's physical integrity but are, in fact, saving the patient's life. The issue could be that the patient perceives these interventions as threatening injury or death to him/herself due to alterations in cognition resulting from disease processes, medications used in the ICU, the disorienting nature of the ICU environment, and invasive procedures such as mechanical ventilation (Jones et al., 2001). This scenario is unique to the ICU experience and is not included in the DSM's diagnostic features. Presumably, clinicians interpret this aspect of the diagnostic criteria loosely and would diagnose PTSD in a post-ICU patient who met all other criteria for the disorder. However, for the purposes of research, measuring prevalence, and defining risk factors, the concept of ICU-related PTSD should be more carefully defined.

Concepts are often called the building blocks of theory. They are a representation of a thing, experience, or phenomena that allows one to classify and compare experiences in a systematic way. Walker and Avant's (2011) approach was used to conduct a concept analysis of ICU-related PTSD. The goal of constructing a concept analysis is to set clear and discreet boundaries for what a concept is and is not. The final product is a working operational definition, with the expectation that as new research is completed, the definition may need to be revised. The process includes eight steps described in a linear fashion, yet most often, these steps are revisited and adjusted throughout the process as new information about the concept is uncovered. The steps are as follows: (1) select a concept, (2) determine aims or purposes of analysis, (3) identify all uses of the concept, (4) determine defining attributes, (5) identify a model case, (6) identify borderline, related, and contrary cases, (7) identify antecedents and consequences and, (8) define empirical referents.

Data sources

A comprehensive literature search using CINAHL, PubMed, Google Scholar, and MEDLINE, as well as a search of dictionaries, reference books, and the internet for the dates of 1960 to 2013 was conducted. The terms 'post-traumatic stress disorder', 'PTSD', 'stress', 'post-intensive care syndrome', 'critical care', 'post-traumatic stress syndrome', 'ICU', and 'intensive care unit' were used in various combinations to ensure all relevant information was found. Furthermore, the reference sections of relevant articles were scanned for other manuscripts that might have been missed during the literature search. Approximately 40 articles were found to be relevant and included in this analysis. The ultimate aims of this analysis were to define the concept for future research as well as begin the process of creating an operational definition of ICU-related PTSD.

Results

Identifying all uses of the concept

Part of the process of concept analysis is to uncover all uses of the concept in various types of media and across all disciplines (Walker and Avant. 2011). The term intensive care unit (ICU) is consistently defined among sources. An example is, "Intensive Care Units cater to patients with the most severe and life-threatening illnesses and injuries; that require constant, close monitoring and support from specialist equipment and medication in order to maintain normal bodily functions. They are staffed by highly trained doctors and critical care nurses who specialize in caring for seriously ill patients." (Intensive care unit, 2013).

One dictionary definition of post-traumatic stress disorder was, "a psychological reaction occurring after experiencing a highly stressing event (as wartime combat, physical violence, or a natural disaster) that is usually characterized by depression, anxiety, flashbacks, recurrent nightmares, and avoidance of reminders of the event" (Post-traumatic stress disorder, n.d.). Wikipedia described it similarly, stating, "(PTSD) is a severe condition that may develop after a person is exposed to one or more traumatic events, such as sexual assault, serious injury or the threat of death. The diagnosis may be given when a group of symptoms such as disturbing recurring flashbacks, avoidance or numbing of memories of the event, and hyper-arousal (high levels of anxiety) continue for more than a month after the traumatic event" (Post-traumatic stress disorder, 2013). Finally, the term post-traumatic stress syndrome (PTSS) was noted to be used frequently in the literature when a patient had many of the symptoms of PTSD but did not meet full diagnostic criteria as outlined in the DSM (Table 1). These definitions consistently described PTSD and its symptoms as resulting from an actual threat of harm or death but made no mention of the disorder being caused by an individual's perception of an event as life-threatening, which is often the case in the ICU.

The DSM-5 chapter on PTSD 309.81 (APA, 2013) discussed a wide range of events that can lead to the development of PTSD. Yet, when it comes to PTSD due to traumatic medical events, it is limited to, "sudden, catastrophic events" and gives waking during a surgery or anaphylactic shock as examples. Unfortunately, ICU-related PTSD does not fit within those limitations. The DSM goes on to list the diagnostic criteria for the disorder presented in Table 1.

Patients who are diagnosed with ICU-related PTSD meet all criteria in Table 1, with the exception of the symptoms being due to an actual threat to physical integrity and not due to the effects of drugs or a medical condition, criteria A and H, respectively. ICU patients often experience delirium as a result of their medical condition and sedating medications they receive in the ICU (Figueroa-Ramos et al., 2009; Freedman et al., 2001), which is in direct opposition to criterion H. What further complicates this process is the diagnostic features set forth by the DSM when defining what constitutes a traumatic medical experience. Criterion A is often not met by ICU patients because while they may have a life-threatening illness, it is not the illness alone that causes PTSD, but the interventions and environment the patients experience in the ICU to save their lives. Despite this, patients are, in fact, experiencing PTSD as a direct result of their ICU experience (Crunden 2010, Davidson et al., 2013).

Acute stress disorder (ASD). In defining ICU-related PTSD, it is important to consider disorders that are similar and must be ruled out in order to make a diagnosis of PTSD. The diagnosis most similar to and most easily confused with PTSD is ASD, because it is comprised of the same Criterion A as PTSD, stating that the individual experiences or witnesses a trauma that threatens actual serious harm or death. The diagnosis also has the same categories of intrusion, negative mood, dissociation, avoidance, and arousal but only requires a total of nine symptoms from any of the five categories. Finally, the symptoms of ASD must be present for three days to no more than one month after the traumatic event versus PTSD, in which the symptoms are present for over one month. As in PTSD, the symptoms of ASD must cause significant distress or impairment in an important aspect or function of the patient's life and cannot be due to

drugs or a medical condition (APA, 2013). The diagnosis of ASD in ICU patients poses the same issues as PTSD with respect to the cause, thereby falling outside of the definition as outlined in the DSM-5 (Table 1).

Post-intensive care syndrome (PICS). A group of researchers interested in long-term outcomes of ICU patients has identified a syndrome termed post-intensive care syndrome (PICS) in which patients experience impairment in three areas (a) functional or physical deficits, (b) cognitive impairment, and (c) psychosocial issues such as trouble returning to work and maintaining productivity, depression, sleep problems, and PTSD (Davidson et al., 2013). In this case, PTSD is mentioned as part of a larger syndrome affecting this patient population, yet it remains unclear if patients with PICS have PTSD, PTSS, ASD, or if this is a moot point (Table 1). The primary issue with not defining this group of symptoms in post-ICU patients is it makes it difficult to measure the scope of the problem and determine how to address and minimize it in critically ill patients.

Defining Attributes

According to Walker and Avant (2011), the defining attributes of a concept are characteristics most often associated with the concept. The defining attributes for the concept of ICU-related PTSD were chosen based on the literature and five distinct diagnostic criteria found in the DSM for PTSD. The concept of ICU-related PTSD specifically excludes (1) individual experiences an *actual* life threatening event (PTSD criteria A) and (2) the symptoms cannot be related to a medical condition and medications (PTSD criteria B). It is important to mention here that while the illness the patient has might be life threatening, ICU-related PTSD is due not only to the illness, but

to the treatments and interventions the patient experienced as a result of being in the ICU. With those two exclusions in mind, the defining attributes of ICU-related PTSD are presented in Table 2.

As delineated in the defining attributes, all criteria for meeting the DSM-5 diagnosis of PTSD are included with the exception of criteria A and H. Furthermore, the symptoms are the result of receiving critical care in an ICU. For patients who are screened using a self-report measure or displaying many of the symptoms of PTSD but are undiagnosed, the term ICU-related PTSS should be used to be consistent with the general use of the terms in the medical and psychiatric communities. This concept analysis is based on the current DSM and should be revised as the DSM adjusts its definition of PTSD. The working operational definition of ICU-related PTSD is the development of stress symptoms (intrusion symptoms, avoidance, depressed mood, cognitive impairment, hyper-arousal) that occur together for at least one month and cause significant functional impairment as a direct result of experiencing life-saving interventions and medications in a critical care environment.

Model Case

A model case, as defined by Walker and Avant (2011), is an example of the concept that includes all of the defining attributes. Sarah was a patient in the ICU for two weeks where she was intubated and sedated. She has little memory of this time but has been having dreams that her nurse was trying to suffocate her and that she could not move; she was helpless. After she was discharged home, she avoided her physician appointments, had difficulty remembering events from her ICU stay that she could

remember a few weeks ago, and had little interest in spending time with her husband. Additionally, she could not sleep at night and was having trouble concentrating. These symptoms lasted approximately 5 months and significantly affected her relationship with her husband. In addition, she found herself in frequent meetings with her boss regarding her lack of productivity at work and tardiness.

This is an example of a model case of ICU-related PTSD because is includes all of the defining attributes. The patient is re-experiencing her ICU stay via nightmares. She is avoiding stimuli that remind her of her stay as manifested by not attending follow up appointments. She is experiencing hyper-arousal, manifested as trouble sleeping and concentrating. The negative alterations in mood and cognition are exemplified by her trouble remembering aspects of her ICU stay and decreased interest in interacting with her husband. The symptoms have lasted over one month, affected both her social life and occupation, and were the direct result of the interventions she received in the ICU.

Borderline Case

A borderline case is an example that includes most of the defining attributes. Mark was in the ICU for one week due to complications with his progressing congestive heart failure and was intubated and sedated during this time, of which he has no memories. Upon discharge from the hospital, he began having horrible nightmares about the ICU. He found it difficult to be with his friends and family and avoided conversations with them as they always wanted to discuss his health, which caused his heart to race accompanied by excessive perspiration. He simply felt void of any feelings at all for things and people he used to love. Additionally, he felt like he was in a daze and

unconnected to home and surroundings. Finally, he found it difficult to sleep; he was easily irritated, and had trouble concentrating when performing simple tasks. During that time Mark did not attend his follow up appointments with his physician and was not eating appropriate amounts of food, living in a clean environment, or performing daily hygiene, causing his family to worry about him. At this time the symptoms have been going on for three weeks since his ICU experience.

The borderline case described above is an example of someone who would be diagnosed with ASD according to the DSM-5 because he is exhibiting at least 9 symptoms from the 5 categories and the symptoms have been present for only 3 weeks. This also rules out the diagnosis of PTSD, even if he met all criteria for PTSD, because the symptoms have not been present for over one month. If Mark were to see a physician at this point, he would potentially receive a diagnosis of ASD or ICU-related ASD.

Related Case

The related case, like the borderline case, does not contain all of the defining attributes of the concept. The aim of the related case is to demonstrate a concept very similar to the concept being analyzed in order to show how these concepts are related, yet different. John was in the ICU for 3 weeks with acute respiratory distress syndrome for which he was intubated and sedated. John remembered some events from his ICU stay, having some delusional memories of the hospital staff abusing him and trying to kill him. John was initially scared of these memories but felt that they were probably not accurate and did not actually occur. Initially, he did not want to talk with friends and family about these feelings, and they found him irritable and hard to be around, straining his

relationship with his daughter and wife. Once he was home he had difficulty sleeping but these symptoms resolved after a month.

This is an example of a related case because the patient is re-experiencing his ICU stay via delusional memories. He meets criteria for intrusion symptoms, avoidance, and hyper-arousal with the symptoms of sleep difficulty and irritability. The symptoms lasted over a month, negatively affecting his social relationships and were a direct result of the treatments he received in the ICU. He does not have any symptoms from the negative alterations in mood or cognition category; therefore, John does not meet criteria for ICU-related PTSD. This is an example of someone having most of the symptoms but not meeting full diagnostic criteria, a condition that would be called post-traumatic stress syndrome (PTSS) or ICU-related PTSS.

Contrary Case

A contrary case is a clear example of what the concept is not. Mary was in the ICU for 3 weeks for treatment of urosepsis. During her ICU stay, she was intubated and sedated. After Mary was discharged from the hospital, she attended physical therapy and welcomed friends and family's help around the house. Mary was happy to be home and grateful that she survived her illness. She looks back on her stay in the ICU as a blessing and visited the unit two months after she was discharged to thank the physicians and nurses who cared for her. She could not remember all of the nurses who introduced themselves and said they cared for her, but she expressed her gratitude just the same. Mary looks forward to visiting her grandchildren in the next few months now that she

feels better. This is an example of a contrary case because Mary is not re-experiencing her ICU stay or presenting with any other symptoms of PTSD.

Antecedents

Walker and Avant (2011) defined antecedents as events that must take place prior to the concept in order for it to occur. Two antecedents were identified for ICU-related PTSD to occur. The first is that a patient receives treatment in an ICU. There is no time limit for how long or short the ICU stay or what interventions or treatments the patient receives. Second, the patient perceives these treatments and interventions as life threatening instead of life saving. This must occur in order for the disorder to develop; it is a trigger, not an attribute of the concept. If the patient perceives the treatments and interventions as helping to treat the illness or injury, despite being unpleasant, ICU-related PTSD would not be triggered.

Consequences

Consequences are outcomes that occur due to the concept (Walker and Avant, 2011). Patients experience post-discharge setbacks in recovering from the illness or injury that required hospitalization (Abu-Ruz et al., 2011). This could be the result of patients avoiding follow up appointments, being unable to perform certain health maintenance tasks that remind them of treatments performed in the ICU, or due to prolonged activation of the human stress response, that can lead to cardiovascular and inflammatory disorders. ICU patients who are diagnosed with ICU-related PTSD have poorer physical health and a greater likelihood of developing another psychological disorder such as depression (Kessler et al., 2005). Examples of health issues common to

patients with PTSD are coronary disease, metabolic syndrome, and autoimmune disorders like hypothyroidism and psoriasis (Boscarino 2004; Violanti et al., 2006; Kubzanksy et al., 2007). A final consequence of ICU-related PTSD is a decreased quality of life (QOL) compared to ICU patients not meeting criteria for the disorder (Jackson et al., 2011). Factors that contribute to the decrease in QOL are strained interpersonal relationships, decreased functionality and productivity, and loss of job (Myhren et al., 2010). A concept map diagraming how the defining attributes, antecedents, and consequences are related are presented in Figure 1.

Empirical Referents

According to the Walker and Avant model (2011), empirical referents are phenomena that demonstrate that the concept exists. Therefore, empirical referents should link back to the defining attributes. The first empirical referent for ICU-related PTSD is the patient was admitted to the ICU and perceived the interventions as life threatening due to alterations in cognition associated with the severity of illness, medications used, or the disorienting environment of the ICU. Next, examples of the empirical referent of intrusion would be the presence of unwanted thoughts or memories, nightmares, or delusions of the ICU experience. Empirical referents for avoiding stimuli associated with the event would be avoiding speaking or thinking about what happened in the ICU as well as avoiding places, situations, or people that remind the patient about the event. Additionally, the patient could experience difficulty remembering aspects of the event, decreased interest in participating in events previously enjoyed, detachment from others, numbing of feelings, and anticipating not having a future. Empirical referents for hyper-arousal might include trouble sleeping, irritability, anger, hyper-vigilance, and heightened

startle response. Finally, all of the above symptoms would be present for at least one month and would cause significant impairment in a social or occupational setting or another important area of functioning for that patient.

Discussion

PTSD as a result of critical care is a newer topic of research as well as a largely unrecognized consequence of life-saving interventions by critical care nurses and physicians. As a result, the phenomenon and language used to describe it are still evolving. The studies addressing ICU-related PTSD focus on the person and ICU environment factors that put patients at higher risk for the development of these stress symptoms and target interventions that can reduce the incidence of PTSD in this population. Yet, there is little research attempting to define what this set of symptoms is and is not. In past studies, many researchers examining stress in the ICU population have not specified if their participants have been diagnosed with PTSD or another stress disorder. Furthermore, many researchers use questionnaires or self-report measures to assess ICU-related PTSD rather than actually conducting an evidence-based diagnostic interview. This complicates the interpretation of results across studies, as the reader is unsure if PTSD or another stress disorder has been identified in the sample. Lack of consensus also makes it difficult to determine the prevalence of PTSD in an ICU population.

Therefore, researchers are using a variety of terms to describe the set of symptoms found in their samples. This inconsistent use of terms among researchers makes it difficult to compare studies, gauge prevalence of the disorder in the ICU population, and

determine how to screen and treat patients who experience ICU-related PTSD. Thus, a concept analysis was needed to encourage those interested in the critically ill population to take a step back and examine what it is that is being studied. Therefore, the working operational definition of ICU-related PTSD is the development of stress symptoms (intrusion symptoms, avoidance, depressed mood, cognitive impairment, hyper-arousal) that occur together for at least one month and cause significant functional impairment as a direct result of experiencing life-saving interventions and medications in a critical care environment.

Limitations

The temporality of the concept is unclear as the patient's symptoms could begin while in the ICU, upon transfer to a lower level of care, or after being discharged home. More research examining when the symptoms occur is needed to clarify this aspect of the concept analysis. Another limitation of this concept analysis was the inability to incorporate literature written in other languages, thereby missing documents that could contribute to this analysis. Finally, while the authors attempted to be thorough and systematic in the literature review, there are terms and sources of information that could have been missed and therefore, not considered in this concept analysis.

Conclusion

The concept ICU-related PTSD was largely derived from the DSM-5 diagnostic criteria with the addition of a patient's *perceptions* of the treatment of their condition in the ICU as causing death or serious injury versus an *actual* threat. Furthermore, the

operational definition allows for disease state and medication to be potential contributing factors in the development of ICU-related PTSD.

By defining the boundaries of this concept, future research can be done to determine prevalence rates and risk factors associated with this set of symptoms. Second, it provides a definition for consistent use in future research so that findings across studies can be more easily compared. Finally, this concept analysis can serve as a foundation for a screening tool for ICU-related PTSD that would include not only the DSM criterion B-G, but the environment and treatment factors unique to the ICU that have been shown to increase the risk of ICU-related PTSD, such as the use of sedation, vasopressors, and mechanical ventilation.

Recommendations for nursing practice include increasing awareness through education to empower nurses to identify the symptoms and risk factors associated with ICU-related PTSD, use evidence to mitigate these risks, and be aggressive in titrating down sedation medications, promoting extubation using daily awakening protocols and early mobilization protocols, and creating a restful environment at night to promote a normal sleep-wake cycle (Davydow et al., 2008; Figueroa-Ramos et al., 2009; Freedman et al., 2001; Kress et al., 2003). Nurses can also encourage patients to journal about the experience once they recover or encourage family members to journal daily on what was happening to their loved one and include photos of their stay in the ICU. This has been shown to fill gaps in the patient's memory and reduce symptoms of PTSD (Jones et al., 2010). Nurses can also be instrumental in promoting hospital-wide protocols to improve overall outcomes in ICU patients that not only reduce the risk of ICU-related PTSD while in the ICU, but also promote recovery when the patients are moved to step-down units or

medical-surgical units and in outpatient settings. Nurses are in a unique position to have a major influence on reducing ICU-related PTSD because interventions to reduce this form of stress are largely under the purview of nurses.

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Table 1

ICU-Related PTSD and Similar Concepts

PTSD: DSM-5	ASD: DSM-5	PTSS	ICU-related PTSD	PICS
Criterion	Deviations from DSM-5 PTSD criteria[1]			
A: The individual experiences an actual or threat of death, serious injury, or sexual violence via direct experience, witnessing, or learning of the event.	Patient experiences nine symptoms from any of the five categories	Individual experiences any combination of these symptoms, at any time, and the symptoms cause some level of distress or impairment but are sub-threshold for diagnosis	*Perception* of threat or injury	Not defined
B: Intrusion symptoms At least one of the following symptoms: intrusive and distressing memories of the event, recurrent dreams of the event, dissociation experienced as flashbacks in which the individual acts as if he/she is experiencing the event, intense and prolonged emotional distress or physiological reactions when reminded of the event.				
C: Avoidance The individual either avoids memories or thoughts of the event or avoids external reminders (people, places, activities) of the event.				
D: Negative alterations in cognition and mood At least two negative alterations in mood or cognition : amnesia, persistent negative beliefs, decreased interest in people or activities, inability to have positive emotions, persistent negative emotional state, distorted cognition about consequences or causes of the event, and detached feelings.				
E: Arousal and reactivity Two or more symptoms of arousal or reactivity: irritability, hypervigilance, decreased concentration, reckless or self-destructive behavior, exaggerated startle response, or sleep disturbance.				
F: Symptoms must be present for over one month.	Symptoms last three days to one month			
G: Symptoms must cause significant distress or impairment in social, occupational, or another important area of functioning.				
H: Symptoms cannot be due to the			Medical	

effects of drugs or another medical condition.			condition and drugs *can* contribute to development of symptoms	

1- Blank cells indicate criteria are the same as the PTSD: DSM-5 criteria.

2- Post-traumatic stress disorder (PTSD), Diagnostic and Statistical Manual of Mental Disorders, 5th edn. (DSM-5), Post-traumatic stress symptoms (PTSS), Acute stress disorder (ASD), Post-intensive care syndrome (PICS).

Table 2

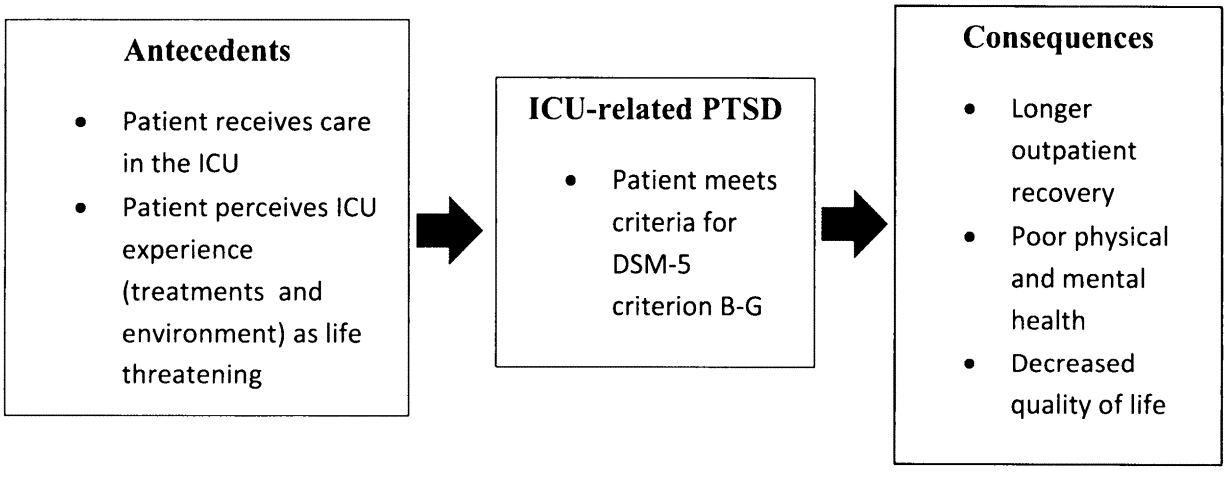
Defining Attributes of ICU-Related PTSD

Defining Attributes	
1. The individual experiences the following symptoms as a result of perceiving the ICU experience as life threatening:	Intrusion symptoms of his/her time in the ICU via nightmares, memories, flashbacks, or intense emotional distress or physical symptoms when reminded of the ICU.
	Avoidance of stimuli associated with the ICU.
	At least 2 symptoms outlined in the DSM-5 category of negative alterations in cognition or mood.
	At least 2 symptoms of increased arousal and reactivity listed in the DSM-5.
2. All of these symptoms occur together for more than one month.	
3. The symptoms cause significant distress or impairment in social, occupational, or other important areas of general functioning (APA, 2013).	

Post-traumatic stress disorder (PTSD), Diagnostic and Statistical Manual of Mental Disorders, 5th edn. (DSM-5)

Figure 1

Concept Map of ICU-Related PTSD



Identification of Posttraumatic Stress Disorder Symptoms in Post-ICU Patients

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Key words: Posttraumatic stress disorder, PTSD, Intensive care unit, ICU, critical care, screening, patient outcomes, nursing

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Abstract

Background: Critically ill patients are experiencing post-traumatic stress syndrome (PTSS) as a result of life-saving interventions received in the ICU. PTSS is associated with poor patient outcomes and decreased quality of life compared to post-ICU patients without PTSS. Personal and clinical characteristics that place patients at higher risk for PTSS are still being examined. It is also unknown to what extent patients are being screened for ICU-induced PTSS.

Objectives: The aims of this study were to: (1) identify screening and educational experiences related to PTSS, (2) determine the feasibility and acceptability of a screening instrument to identify PTSS, and (3) describe the personal and clinical characteristics related to increased risk for PTSS.

Methods: A single-center, descriptive, correlational design was used. Personal and clinical characteristics were obtained from medical records on a sample of 41 patients recently transferred out of a MICU or SICU. Two to 4 weeks after hospital discharge patients completed the Post-Traumatic Stress Syndrome 14-Questions Inventory (PTSS-14) and a Screening Experience Questionnaire via telephone to elicit information about screening experiences and the acceptability of the PTSS-14 as a screening tool. Associations between the personal and clinical characteristics and PTSS-14 scores were examined, and screening experiences were described.

Results: Only 10% of patients had been routinely screened for PTSS in the hospital and none had received education on PTSS after or during their ICU admission. The majority of patients preferred screening to occur in the outpatient setting (44%), 32% wanted

screening performed prior to leaving the hospital, and 24% had no preference for when screening occurred. Patients overwhelmingly felt the PTSS-14 was easy to understand, caused little distress, and was completed in an acceptable time-frame. Seventeen percent (17%) of patients scored ≥45 on the PTSS-14 suggesting they would likely meet diagnostic criteria for post-traumatic stress disorder (PTSD). Higher PTSS-14 scores were correlated with depression, moderate levels of sedation, number of days sedated, and a positive CAM-ICU test during their ICU stay. Other variables were examined, but did not reach statistical significance.

Conclusions: This study suggests the majority of ICU patients are not being screened for PTSS despite the higher prevalence rate of PTSS in the post-ICU population compared to the general population. Early identification of individuals who are experiencing higher levels of post-traumatic stress symptoms may allow for more timely intervention and improved patient outcomes.

Background

Receiving life-saving interventions in an intensive care unit (ICU) have been associated with the development of post-traumatic stress disorder (PTSD) (Wade, Hardy, Howell, & Mythen, 2013) in patients. PTSD is a cluster of symptoms that can include intrusion symptoms, such as re-experiencing the event via nightmares or flashbacks, avoiding people or places associated with the event, depressed mood, trouble concentrating, irritability, and hypervigilance. These symptoms must last for at least one month and cause distress or dysfunction in social or occupational domains in order to meet diagnostic criteria for PTSD (American Psychiatric Association [APA], 2013). The prevalence of PTSD in the post-ICU population is estimated to be 17% based on a large, randomized, cohort study using a structured clinical interview (O'Donnell et al., 2010). This number is substantially higher than the prevalence of PTSD in the U.S. adult population which is 6.4% (Pietrzak, Goldstein, Southwick, & Grant, 2011).

PTSD and post-traumatic stress syndrome (PTSS), which occurs when patients experience many of the symptoms of PTSD but fail to meet that clinical diagnostic threshold, have been linked to development of many medical and psychiatric disorders. Increased cardiac morbidity and mortality has been demonstrated in both men and women with diagnosed PTSD and has been associated with increased cardiac mortality in a large sample of male veterans (Boscarino, 2008; Kubzansky, Koenen, Jones, & Eaton, 2009). PTSD is linked to autoimmune disorders like arthritis, rheumatoid arthritis, and psoriasis (Boscarino, 2004). A study of 36,984 Canadian men and women found PTSD to be associated with respiratory distress, chronic pain, gastrointestinal disorders, cancer, and higher rates of suicide (Sareen et al., 2007). Patients suffering from PTSS after ICU

care have demonstrated a decreased quality of life compared to post-ICU patients not experiencing PTSS and only half had returned to work after one year (Myhren, Ekeberg, & Stokland, 2010).

Untreated PTSS can complicate physical and emotional recovery; however, patients who are identified and treated early may have improved health outcomes. Peris et al. (2011) found that incorporating a psychology consultation for ICU patients prior to ICU discharge resulted in a lower incidence of PTSS (21%) in the group receiving the psychology consult compared with 57% in a control group who did not meet with the psychologist. Jubran et al. (2010) found that using a screening tool, such as the Post-Traumatic Stress Syndrome 10-Item Inventory (PTSS-10), was an efficient way to identify patients suffering from PTSS and refer them to treatment. Despite these encouraging results, there is little research exploring the extent to which post-ICU patients are being screened for PTSD symptoms, nor is there evidence demonstrating the feasibility and acceptability of incorporating PTSS screening in a post-ICU population.

Factors associated with development of PTSS can be categorized as personal characteristics (such as age, gender), clinical characteristics, and specific medications and interventions used in the ICU. For instance, in a sample of 114 adult ICU patients, those younger than 65 were 5.6 times more likely to have PTSS than patients 65 years or older (Wallen, Chaboyer, Thalib, & Creedy, 2008). Pietrzak et al. (2011) found higher rates of PTSD in female versus male participants, and in those with a history of psychiatric illness or suicide attempt.

There is growing evidence that the medications given in the ICU to keep the patient alive and comfortable are associated with PTSS. In a study of 157 ICU patients it was found that longer duration of sedation was the strongest clinical risk factor for the development of PTSS. Additionally, vasopressors and inotropes were associated with higher rates of anxiety (Wade et al., 2012). Patients who experienced more traumatic memories (nightmares, hallucinations, anxiety, panic, memories of pain and respiratory distress) after the ICU reported more stress and PTSD than post-ICU patients not reporting traumatic memories (Hauer et al., 2009). Research examining the relationship between PTSS and clinical characteristics such as length of stay in the ICU, severity of illness, mechanical ventilation, and the development of ICU delirium remain inconclusive (Davydow, Gifford, Desai, Needham, & Bienvenu, 2008; Davydow, Katon, & Zatzick, 2009), but suggest risk factors that place patients at greater risk for development of PTSS and PTSD.

There is limited research targeting the screening for and education of patients about PTSS following their discharge from the ICU. Furthermore evidence is needed to determine what personal and clinical characteristics place the patient at greatest risk for developing PTSS. Therefore, the aims of this study were to:

4. Identify patient screening and educational experiences related to PTSS following discharge from the ICU.
5. Determine the feasibility and acceptability of a screening instrument to identify PTSS.
6. Describe the person and clinical characteristics related to increased risk for PTSS.

Methods

Theoretical Framework

This study is guided by the Transactional Theory of Stress and Coping (TTSC) developed by Lazarus and Folkman (1984). The theory emphasizes the relationship between person and environment in the development of stress with the two major themes of appraisal and coping. Stress is theorized to occur when the environmental demands exceeds one's internal and external resources. The variables in this study were divided into personal and environmental (ICU) factors that can lead to increased stress. While coping was not specifically addressed in this study, early screening for PTSS was the primary aim. Screening for symptoms would, ideally, lead to treatment and support of positive coping mechanisms.

Study Design

The study underwent review and was provided with oversight by the Institutional Review Boards (IRB) of the participating hospital and the University of San Diego. A descriptive, correlational, cross-sectional design was used to describe the screening experiences of post-ICU patients for PTSS and examine the relationships between PTSS and risk factors for ICU-induced PTSS. A convenience sample of 47 men and women who received care in a 13-bed medical ICU and/or a 20-bed surgical ICU at a tertiary level academic medical center in southern California were recruited to participate in this study.

Participants were eligible for study enrollment if they were (a) at least 18 years of age, (b) able to read and understand English, (c) had no diagnosis of PTSD prior to this

hospitalization, and (d) experienced an ICU stay ≥ 24 hours. Patients were excluded from the study if they had a history of traumatic brain injury, current altered mental status or delirium, were in state custody, or were unable to complete the follow-up phone call.

The patients who had received discharge or transfer orders from the ICU were approached by the researcher once they had been extubated and off sedation for at least 24 hours. If eligible to participate, patients signed an informed consent, and demographic data was collected (marital status, race, income, and education level). Clinical and further demographic data was extracted from medical records. Participants were called 2-4 weeks after discharge from the hospital by the researcher to complete the Post-Traumatic Stress Syndrome 14-Item Scale (PTSS-14) and Screening Experience Questionnaire by phone. Participants experiencing stress symptoms at the time of the phone call were referred to treatment.

Measures

Personal and clinical characteristics. Person characteristics included age, gender, marital status, level of education, race, and income. Clinical characteristics included medical and psychiatric history, reason for ICU admission, ICU type, total ICU days, total hospital days, sedation used and dosage range, number of days sedated, any daily awakening trial performed, number of vasopressors used and days patient received vasopressors, use of β-blockers or corticosteroids, number of days restrained, and number of days mechanically ventilated.

Level of agitation was measured by the Richmond Agitation-Sedation Scale (RASS); a 10-item scale ranging from +4 "combative" to -5 "unarousable". The RASS is

a highly valid and reliable tool (Ely et al., 2003) noted for high interrater reliability (kappa = 0.956) (Sessler et al., 2002). Delirium was measured using the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) score. The CAM-ICU is also found to be a valid and reliable tool with high interrater reliability (Kappa = 0.96) (Ely et al., 2001).

Measures. The Screening Experience Questionnaire evaluated the participant's PTSS screening experience, defined as the extent to which study participants were assessed for, and/or educated about PTSS after recovering from their critical illness by a nurse or physician, demographic data that were not in the medical record (i. e., level of education, race, ethnicity, socioeconomic status, and marital status), and the feasibility of administering the PTSS-14. For feasibility, three questions were asked using a 5-item Likert scale to assess how easily the participant was able to understand the questions, if the participant felt the questionnaire was completed in an acceptable time-frame, and if they had experienced any distress in answering the questions. Participants were also asked if they would prefer to fill out the PTSS-14 as an inpatient, an outpatient, or had no preference.

Posttraumatic stress syndrome (PTSS) is defined as the presence of most, if not all, of the symptoms needed to meet criteria for a diagnosis of PTSD based on the Posttraumatic Stress Syndrome 14-Questions Inventory (PTSS-14) score, a 14-item 7-point Likert-scale questionnaire. Total scores range from 14 to 98 with higher scores indicating more PTSD symptoms. Scores $\geq$ 45 are associated with a PTSD diagnosis. This scale has been validated in ICU patients with a high concurrent validity (r=0.86) when compared to the PTSD Diagnostic Scale (PDS). Receiver operator characteristic

demonstrated high sensitivity (86%) and specificity (97%) with an optimal cut off of 45 points to diagnose PTSD. Internal consistency at 4-14 days post-discharge was high at 0.89 (Twigg, Humphris, Jones, Bramwell, Griffiths, 2008). For the purposes of this study the PTSS-14 was analyzed both as a continuous variable (total score) and as a categorical variable. The PTSS categories were defined as PTSD and No PTSD with scores ≥ 45 meeting criteria for PTSD and scores < 45 not meeting criteria for PTSD. This study also aimed to examine if this short and easily administered screening instrument is a feasible and acceptable approach for identifying post-ICU discharge patients at risk for PTSD.

Statistical Analysis

Descriptive statistics and measures of central tendency summarized participant characteristics. One-way ANOVA and Pearson correlations examined relationships between continuous variables, point-biserial correlations and Chi-square tests evaluated relationships between categorical variables. The continuous PTSS-14 score was dichotomized to identify participants at higher risk for PTSD (labeled "PTSD") and those at lower risk for PTSD (labeled "no PTSD"). The cutoff score for PTSD versus no PTSD was ≥ 45 (Twigg et al., 2008). SPSS version 21 was used to analyze the data.

Results

Forty-seven (47) participants were enrolled in the study from August 2013 to January 2014. Forty-one (41) participants completed the study, three participants died prior to receiving the study phone call and three were lost to follow-up. Table 1 presents sample demographics and table 2 summarizes the clinical characteristics of the sample.

Table 3 describes the screening and education experiences of the sample. Of the four participants who reported being screened for ICU-related PTSS, three were screened by a nurse or physician who asked the participant if he or she was experiencing stress due to their hospital stay. The other participant received more anticipatory guidance in which a nurse mentioned that this was a stressful time and that it's normal to feel stressed, but to seek help if the patient needed it.

Table 4 presents the feasibility and acceptability of the PTSS-14 screening tool. Additional information obtained during the phone call interview was that patients who preferred to be screened as an inpatient felt it was better to be screened once they were stable, not experiencing pain, or were close to being discharged home.

Figures 1 and 2 present PTSS-14 scores both as a total score and dichotomized into PTSD diagnosis and no PTSD diagnosis. Table 5 displays the statistically significant associations between clinical characteristics and PTSS-14 scores both as a continuous and dichotomous variable. Using a one-way ANOVA, higher PTSS-14 scores were correlated with medical history, $F(6,34) = 2.97$, $p<.05$; history of depression; and type of sedation used, $F(5,35) = 3.33$, $p<.05$. Pearson correlations between higher PTSS-14 score and the number of days sedated showed a moderate effect size; $r = .308$, $p\leq.05$. Using Chi-square, the PTSD group was strongly associated with a history of depression, $x^2(1) = 5.62$, $p< .05$; moderately associated with sedation dosage range, $x^2(3) = 9.85$, $p<.05$; and moderately associated with delirium as determined by a positive CAM-ICU test, $x^2(2) = 7.40$, $p<.05$. Other associations between clinical characteristics and PTSS-14 scores examined failed to reach statistical significance.

Discussion

Patients in this sample were generally not screened for PTSS (90%) and none received education about the risk of PTSS after their critical illness. The lack of screening, education, and anticipatory guidance for post-ICU patients is concerning as these acute stress symptoms place patients at risk for physical and psychological comorbidities including cardiovascular disease, autoimmune disorders, depression, and increase risk for suicide. This study demonstrated that the PTSS-14 was considered by patients to be a feasible tool that causes little distress and was completed in an acceptable time frame. However, due to the small convenience sample caution is advised in generalizing our findings beyond this current study. Studies have shown critically ill patients who are identified early and receive treatment, either prior to discharge or within six months of discharge, require little to no follow-up psychiatric care or medications (Peris et al., 2011; Schandl et al., 2011). Future research could address strategies to provide effective treatment and support to patients following an ICU experience.

When the PTSS-14 scores were dichotomized into a PTSD group and no PTSD group, 17% of this sample was likely to meet diagnostic criteria for PTSD. Seventeen percent (17%) is similar to the PTSD prevalence rate in larger studies using either a structured clinical interview or the PTSS-14. Prevalence rates in these studies range from 13-17 % (O'Donnell et al., 2010, Jones et al., 2010). Many participants in this study had PTSS-14 scores between 25-44, which is under the PTSD cut-off score of $\geq$45. While these patients may not go on to develop PTSD, it is likely they are suffering from stress due to their ICU experience and would benefit from screening that could lead to

necessary interventions such as anticipatory guidance, normalizing the experience, and referring the individual for early treatment.

Personal characteristics examined such as age and gender had no association with PTSS in this sample, whereas in the literature younger age and female gender are positively correlated with PTSS (Wallen et al., 2008; Pietrzak et al., 2011). The medical history of patients in this sample was significantly associated with higher PTSS scores, but due to the small numbers in each group we are hesitant to draw any real conclusions. Patients who had depression prior to their ICU admission had higher PTSS-14 scores and fell into the PTSD group when the total score was dichotomized.

No association was found between PTSS-14 scores and type of ICU to which patients were admitted, number of ICU days, or number of hospital days. This supports previous research that also found no association between length of stay and PTSS (Davydow et al., 2008). It also reinforces research that demonstrates ICU-related PTSS in not only among trauma/SICU patients, but MICU patients as well (Davydow et al., 2009).

Delirium, as measured by a positive CAM-ICU test, was found to be moderately associated with those at highest risk for PTSS. The pathophysiology linking delirium to PTSS is still under investigation. However, it is thought to be due to disease process and/or sedation medications used in the ICU (Figueroa-Ramos et al., 2009; Freedman et al., 2001). Patients in this sample who received moderate levels of continuous sedation or only intravenous (IV) push sedation medications were at significantly higher risk for PTSS versus patients who received no sedation or light sedation. Our findings are

in line with previous studies showing lower rates of PTSS associated with lower levels of sedation and no sedation (Davydow et al., 2008; Strom, Stylsvig, & Toft, 2011). Sedation type was found to be significantly correlated with higher levels of PTSS, but the small number of patients in each group limits our ability to draw any definitive conclusions.

Variables such as number of days on vasopressors, number of days restrained, and number of days intubated demonstrated positive associations with higher levels of PTSS. However, no correlation was found between PTSS-14 scores and the use of a daily awakening protocol in sedated patients. The lack of correlation between PTSS and the use of a daily awakening protocol is not completely unexpected, as previous studies have shown daily awakening trials to both decrease PTSS and have no effect on PTSS (Girard et al., 2008; Mehta et al., 2012). The results of this study support findings from previous studies, and suggest important considerations for screening patients who are discharged from the ICU for PTSS.

Limitations

Elements of this study that limit its generalizability are the small sample size and use of a convenience sample from a single clinical site. Patients who remained confused during their hospitalization had to be excluded from participation and medical records reporting psychiatric history may not have been complete.

Strengths

The study addressed an important gap in knowledge about the patient's experience with screening for and education about PTSS in post-discharge from the ICU, and was able to demonstrate that use of the PTSS-14 was both a feasible and acceptable

approach to screening. Study participants had a wide variety of diagnoses and there was a low attrition rate.

Conclusion

In this study a significant proportion of the participants demonstrated high levels of post-traumatic stress symptoms. Associations were shown between high PTSS-14 scores and patients with a history of depression, type of sedation, amount of sedation, number of days sedated, and episodes of delirium as captured by a positive CAM-ICU test. In this study many variables showed positive correlations that failed to reach statistical significance. Therefore, risk factors need to be examined further with a larger sample size before changes in clinical practice can be implemented.

The findings of this study describe the lack of screening and treatment post-ICU patients receive regarding PTSS as well as demonstrate that the PTSS-14 is an acceptable screening tool by patients. PTSS is associated with physical and psychiatric comorbidities that may be prevented if patients are identified early. Further research is needed to address effective strategies in implementing early screening for presence of PTSS, and to determine if early identification and referral of at-risk patients can reduce the incidence of PTSD in this vulnerable population.

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Table 1. Demographics of Study Sample (N=41)

Characteristic	**Findings**
Age – years *M(SD)/range*	49(16.3)/ 20-91
Gender *n(%)*	
Male	28(68)
Education Level *n(%)*	
Some High School	5(12)
High School	12(29)
College	16(39)
Graduate School	8(20)
Marital Status *n(%)*	
Single	14(34)
Married	17(42)
Separated	1(2)
Divorced	7(17)
Widowed	2(5)
Stated Race *n(%)*	
Non-Hispanic/White	22(54)
Black	4(10)
Latino	10(24)
East Asian	2(5)
Middle Eastern/Arab	1(2)
Other	2(5)
Income *n(%)*	
<$20,000	12(23)
$21,000-$40,000	10(24)
$41,000-$60,000	7(17)
$61,000-$75,000	2(5)
$76,000-$100,000	4(10)
>$100,000	6(15)

Table 2. Clinical Characteristics of Study Sample (N=41)

Characteristic	**Findings**
Medical History *n(%)*	
Cardiac Disease	13(32)
Liver Disease	4(10)
Cancer	5(12)
Substance or Alcohol Abuse	2(5)
Other	5(12)
Multiple Diseases	2(5)
None	10(24)
Psychiatric History *n(%)*	
Depression	3(7)
Anxiety	0
None	38(93)
Treating ICU *n(%)*	
SICU	24(59)
MICU	14(34)
Both	3(7)
Days in SICU *M(SD)/range*	2.1(2.2)/0-9
Days in MICU *M(SD)/range*	1.5(2.3)/ 0-8
Total ICU Days *M(SD)/range*	3.6(2.6)/1-14
Reason for ICU Admission *n(%)*	
Septic Shock	6(15)
Liver Transplant	2(5)
Stroke	3(7)
GI Bleed	1(2)
Cardiac Exacerbation	7(17)
Trauma	13(32)
Other	9(22)
Total Hospital Days *M(SD)/range*	12(10.6)/2-63
Sedation *n(%)*	
Midazolam (alone or with opiate)	4(10)
Propofol (alone or with opiate)	2(5)
Precedex (alone or with opiate)	2(5)
Fentanyl	1(2)
Multiple Types Used	1(2)
No Sedation	31(76)
Sedation Dosage Range *n(%)*	
No Sedation	31(76)
Light Sedation	3(7)
Moderate Sedation	5(12)
PRN Sedation (IV push)	2(5)
No. of Days Sedated *M(SD)/range*	.5(1)/0-4
RASS Goal Met *n(%)*	

Over-Sedated	6(75)
Under-Sedated	1(13)
Appropriate	1(13)
CAM-ICU Positive *n(%)*	
Yes	12(29)
No	25(61)
Not Assessed	4(10)
Daily Awakening *n(%)*	
Yes	2(25)
No	5(63)
Not Done	1(13)
No. of Vasopressors *n(%)*	
None	33(81)
One	5(12)
Two or More	3(7)
No. of Days on Vasopressors *M(SD)/range*	.6(1.7)/ 0-9
Corticosteroid Used *n(%)*	
Yes	10(24)
No	31(76)
B-Blocker Used (Infusion) *n(%)*	
Yes	13(33)
No	22(56)
PRN for Hypertension	4(10)
No. of Days Restrained *M(SD)/range*	.4(.9)/ 0-3
No. of Days Intubated *M(SD)/range*	.3(.8)/0-3

Table 3. Screening for PTSS in the ICU Population (N=41)

Was Patient Screened for PTSS?	***n(%)***
Yes	4(10)
No	37(90)
Who Screened Patient? (N=4)	
Nurse	2(50)
Physician	2(50)
In What Setting Was Patient Screened? (N=4)	
Inpatient	2(50)
Outpatient	2(50)
Was Patient Educated About Risk of PTSS After ICU Care?	
No	41(100)

Table 4. Feasibility and Acceptability of the PTSS-14 in Post-ICU Population (N=41)

How easily were you able to understand questions?	***n(%)***
5 Very Easy	37(90)
4	3(7)
3	1(2)
2	0
1 Not Easy At All	0
Was the questionnaire completed in an acceptable time-frame?	
5 Time Was Appropriate	40(98)
4	1(2)
3	0
2	0
1 Took Too Long	0
How much distress did answering these questions cause you?	
1 No Distress	36(88)
2	3(7)
3	2(5)
4	0
5 A Lot Of Distress	0
Would you prefer to fill this (the PTSS-14) before leaving the hospital or at an outpatient follow-up visit?	
Inpatient	13(32)
Outpatient	18(44)
No preference	10(24)

Table 5. Statistically Significant Clinical Characteristics of Study Sample and Their Associations With Total PTSS-14 score and Dichotomized PTSS-14 Score (No PTSD vs. PTSD)[a] (N=41)

Characteristic	PTSS Total Score *P*-value[f]	No PTSD vs. PTSD *P*-value[f]
Medical History	**.019**[b]	.069[c]
Psychiatric History	**.002**[b]	**.018**[e]
Sedation Type	**.015**[b]	.091[c]
Sedation Dosage Range	.052[b]	**.020**[e]
Number of Days Sedated	**.050**[c]	.102[d]
CAM-ICU Positive	.051[b]	**.025**[e]

[a] PTSD determined by PTSS-14 score ≥45. No PTSD group n(%): 34(83), PTSD group: 7(17). [b] One-way ANOVA and eta^2. [c] Pearson-r correlation. [d] Point-biserial correlation. [e] Chi-square. [f] P-value ≤ .05

Figure 1. PTSS-14 Total Score.

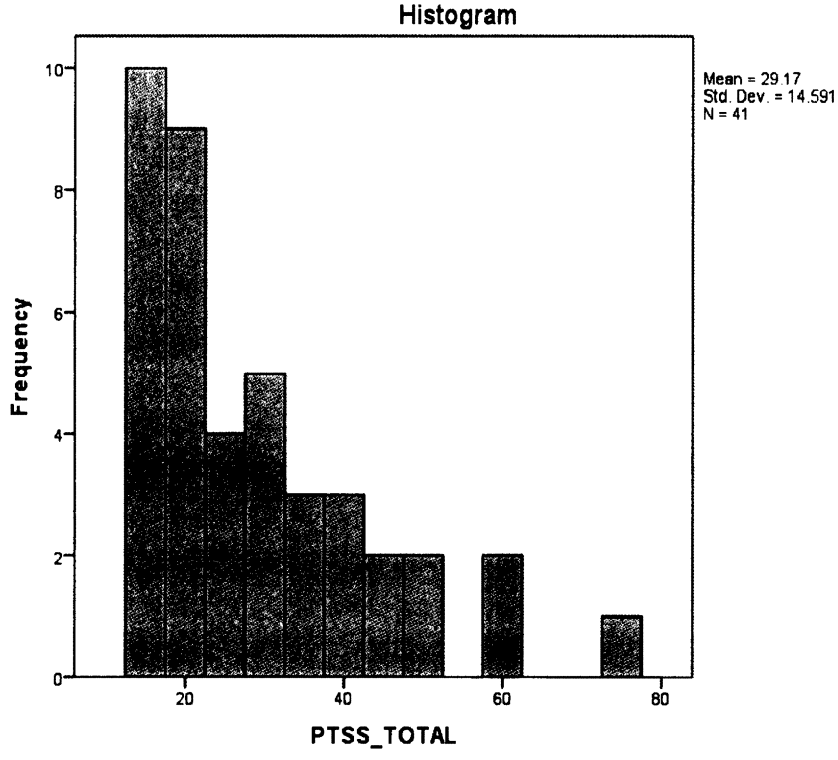
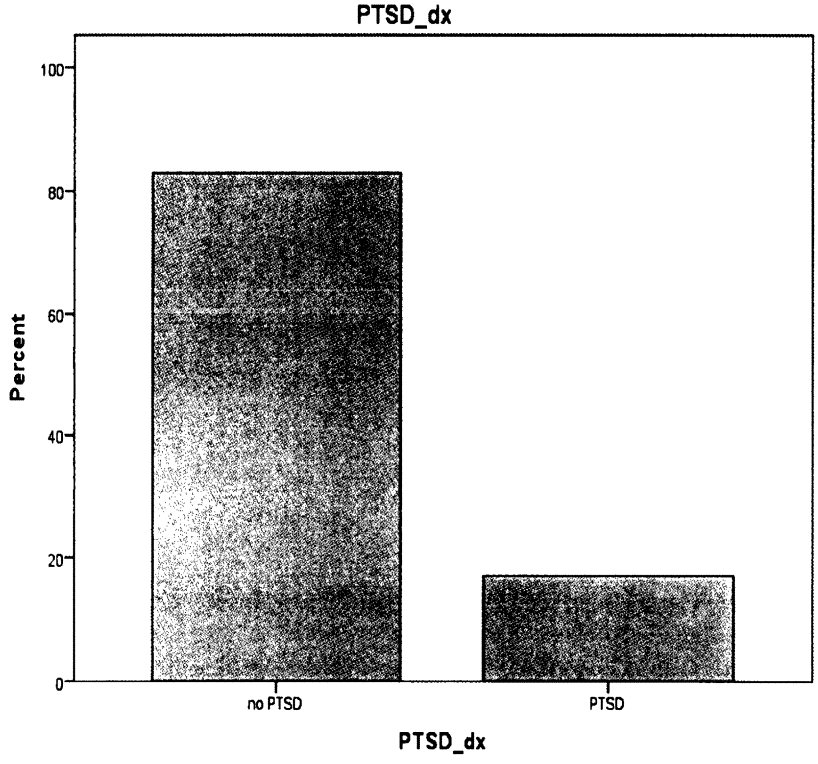


Figure 2. PTSS-14 Dichotomized: No PTSD = <45/PTSD = ≥ 45 (N=41)



Appendix A

PTSS-14 Intensive Care Screen

This form should not take longer than about 5 minutes to complete. The form has two sections, Part A and Part B.

PART A

This consists of four statements about your memory of the time you spent on the Intensive Care Unit. Read each statement. If a statement is FALSE, tick the NO box. If the statement is TRUE, tick the YES box. Please answer ALL four questions. Tick only ONE box for each statement. If you make a mistake, simply cross out the wrong answer and tick the correct box.

PART B

This consists of 10 statements about how you have been feeling in the past few days. You need to decide HOW OFTEN you have been feeling this way in the past few days.

If you have NOT EVER felt or experienced what the statement says in the past few days, circle 1 (never).

If you have been feeling or experiencing it ALL THE TIME, circle 7 (always).

Otherwise, circle one of the numbers in between that best describes how much you have been feeling or experiencing what the statement says in the past few days.
Please circle only one number for each statement. If you make a mistake, simply cross it out and circle the correct number. PLEASE be sure to choose a number for ALL 14 statements.

A. When I think back to the time of my severe illness and the time I spent in the Intensive Care Unit (ICU), I remember:

Nightmares	No	☐	Yes	☐
Severe Anxiety or Panic	No	☐	Yes	☐
Severe Pain	No	☐	Yes	☐
Troubles to breath, feelings of suffocation	No	☐	Yes	☐

B. Presently (this means in the past few days) I suffer from:

*1. **sleep problems***

never						always
1	2	3	4	5	6	7

*2. **nightmares***

never						always
1	2	3	4	5	6	7

*3. **depression, I feel dejected/downtrodden***

never						always
1	2	3	4	5	6	7

*4. **jumpiness, I am easily frightened by sudden sounds or sudden movements***

never						always
1	2	3	4	5	6	7

*5. **the need to withdraw from others***

never						always
1	2	3	4	5	6	7

*6. **irritability, that is, I am easily agitated/annoyed and angry***

never						always
1	2	3	4	5	6	7

*7. **frequent mood swings***

never						always
1	2	3	4	5	6	7

*8. **a bad conscience, blame myself, have guilt feelings***

never						always
1	2	3	4	5	6	7

*9. **fear of places and situations, which remind me of the ICU***

never						always
1	2	3	4	5	6	7

*10. **muscular tension***

never						always
1	2	3	4	5	6	7

11. ***upsetting, unwanted thoughts or images of my time on the ICU***

never						always
1	2	3	4	5	6	7

12. ***feeling numb (e.g. cannot cry, unable to have loving feelings)***

never						always
1	2	3	4	5	6	7

13. ***avoid places, people or situations that remind me of the ICU***

never						always
1	2	3	4	5	6	7

14. **feeling as if my plans or dreams for the future will not come true**

never					always	
1	2	3	4	5	6	7

Duke–UNC Functional Social Support Questionnaire (FSSQ)

Here is a list of some things that other people do for us or give us that may be helpful or supportive. Please read each statement carefully and place an 'X' in the column that is closest to your situation. Give only 1 answer per row.

	5	4	3	2	1
	As much as I would like	Almost as much as I would like	Some, but would like more	Less than I would like	Much less than I would like
1. I have people who care what happens to me.					
2. I get love and affection.					
3. I get chances to talk to someone about problems at work or with my housework.					
4. I get chances to talk to someone I trust about my personal or family problems.					
5. I get chances to talk about money matters.					
6. I get invitations to go out and do things with other people.					
7. I get useful advice about important things in life.					
8. I get help when I am sick in bed.					

Source: adultmeducation.com

Screening Experience Questionnaire

1. How easily were you able to understand the questions?

   (Not easy at all) 1 2 3 4 5 (Very easy)

2. Was the questionnaire completed in an acceptable time-frame?

   (Took too long) 1 2 3 4 5 (Time was appropriate)

3. How much distress did answering these questions cause you?

   (No distress) 1 2 3 4 5 (A lot of distress)

4. How comfortable would you be filling this out at some point during your hospital stay?

   (Not comfortable at all) 1 2 3 4 5 (Very comfortable)

5. How comfortable would you be filling this out in a clinic as an outpatient?

   (Not comfortable at all) 1 2 3 4 5 (Very comfortable)

6. Would you prefer to fill this out before leaving the hospital or at an outpatient follow-up visit?

   Inpatient Outpatient

7. Did a nurse or physician talk to you about the risk of developing stress symptoms as a result of your ICU stay or critical illness?

   Yes No

   a) If yes,
   who?_____

   b) Was this encounter as an inpatient or outpatient?
   Inpatient Outpatient

   c) What did the provider speak with you about?
   _____
   _____
   _____
   _____
   _____

8. Did a nurse or physician provide any teaching about stress symptoms associated with the ICU?

   Yes No

   a) If yes,
   who?_____

   b) Was this encounter as an inpatient or outpatient?
   Inpatient Outpatient

   c) What were the main teaching points you remember?
   _____
   _____
   _____
   _____
   _____
   _____

9. What is the highest degree or level of school you have completed?

Some high school High school College Graduate school

10. What is your current marital status?

Single Married Separated Divorced Widowed

11. What is your race or ethnicity?

	Non-Hispanic White or Euro-American
	Black, Afro-Caribbean, or African American
	Latino or Hispanic American
	East Asian or Asian American
	South Asian or Indian American
	Middle Eastern or Arab American
	Native American or Alaskan Native
	Other _____

12. What is your annual household income?

	<$20k
	$20-40k
	$41-60k
	$61-75k
	$76-100k
	>$100k

Appendix B

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UNIVERSITY OF CALIFORNIA, SAN DIEGO
HUMAN RESEARCH PROTECTIONS PROGRAM

TO: Heather Warlan Mailcode: 8630

RE: Project #130902
Identification of Posttraumatic Stress Disorder Symptoms in Post-ICU Patients

Dear Ms. Warlan:

The above-referenced project was reviewed and approved by one of this institution's Institutional Review Boards in accordance with the requirements of the Code of Federal Regulations on the Protection of Human Subjects (45 CFR 46 and 21 CFR 50 and 56), including its relevant Subparts. This approval, based on the degree of risk, is for 365 days from the date of **IRB review and approval** unless otherwise stated in this letter. The regulations require that continuing review be conducted on or before the 1-year anniversary date of the IRB approval, even though the research activity may not begin until some time after the IRB has given approval.

The IRB determined that this project presents more than minimal risk to human subjects in that the probability and magnitude of harm or discomfort anticipated in the research are greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

Date of IRB review and approval: 7/18/2013

On behalf of the Institutional Review Board,

/rc
Michael Caligiuri, Ph.D.
Director, Human Research Protections Program
(858) 657-5100

Note: IRB approval does not constitute funding or other institutional required approvals. Should your studies involve other review committees such as Office of Clinical Trials Administration (OCTA), Office of Coverage Analysis Administration (OCAA), Conflict of Interest (COI), Protocol Review Monitoring Committee (PRMC), and committees under Environmental Health & Safety (EH&S) such as Institutional Biosafety Committee (IBC), Human Exposure Committee (HERC), and RSSC (Radiation Safety and Surveillance Committee), it is the researchers responsibility to ensure that all approvals are in place prior to conducting research involving human subjects or their related specimens.

Approval release date: 8/1/2013